Exchange Rates and International Competitiveness of the Canadian Economy

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Foreword

This study is one of a number of studies commissioned under the Council's project on Competitiveness and Trade Performance, which has explored why Canadian industry has performed so poorly over the past 20 years. The project compares Canada's performance with those of other industrial and newly industrialized nations. It shows that Canada's situation has been slipping relative to that of its trading partners, and that this jeopardizes future living standards. The project also describes the feedback between the micro-world of management and labour and the macro-world of inflation and exchange rates. Its primary conclusion is that Canadians have not responded quickly and effectively enough to the challenges that have been taking place in international markets.

Professor Richard Harris of Simon Fraser University was asked to undertake the present study to examine the causes and effects of large and persistent fluctuations in the value of the Canadian dollar. At the beginning of the floating exchange-rate regime in the early 1970s, there was a fairly broad consensus that changes in exchange rates would accommodate differences in countries' macroeconomic policies with the least amount of disruption to trade and employment, and would eventually correct trade imbalances among countries.

However, the wide swings in exchange rates under the floating exchange-rate regime have *not* corrected cost-competitiveness problems arising from differences in national productivity growth and inflation rates. Instead, they have led to sharp swings in exports and imports, disrupting normal trading relationships and causing a drop in output and employment in the export and import-competing sectors.

For example, the large depreciation of the Canadian dollar vis-à-vis the U.S. dollar in the early 1980s obscured the adverse impact of slower productivity growth and higher price wage inflation on the cost position of Canadian manufacturing industries relative to their counterparts in the United States. Then, the substantial depreciation of the Canadian dollar after 1986 compounded the cost difficulties of Canadian manufacturers. These wide swings have generated a heated public debate about the appropriate role of monetary and exchange-rate policies in influencing the cost performance of Canadian-traded goods industries.

In his study, Professor Harris concludes that the Canadian dollar was overvalued by between 10 to 15 per cent vis-à-vis the U.S. dollar in 1989. In addition, he finds that the large swings in real exchange rates had a substantial impact on output and employment levels in trade-sensitive industries. However, the study did not find any concrete support for the "trade hysteresis" idea – that a temporarily over- or undervalued exchange rate causes permanent changes in comparative advantage and thus shifts in trade patterns. However, Professor Harris cautions that it is too early to dismiss the possibility that the current (winter 1992) overvaluation of the Canadian dollar will have permanent adverse consequences for Canada's trade performance.

Professor Harris has made important theoretical and empirical contributions to the literature on international trade and trade policy. He is the British Columbia Telephone Professor of Economics at Simon Fraser University.

Judith Maxwell
Chairman

Exchange Rates and International Competitiveness of the Canadian Economy

1 Introduction

The Competitiveness Concept

This study is concerned with the links between the exchange rate and *competitiveness*. It is part of a larger project conducted by the Economic Council on competitiveness that focuses primarily on the real productivity aspects of the competitiveness of the Canadian economy. Unfortunately, the term "competitiveness" is used in so many different ways that it has become almost meaningless; economic policy discussions would be substantially clarified if we all agreed that the term is not sufficiently precise to warrant its use in reasoned debate. Nevertheless, for the worse, it is probably here to stay. In popular journalistic usage, the term "competitiveness" means one nation being able to compete with other nations in the global marketplace. In turn "to compete" means the ability to sell a product which is either of superior quality or more cheaply produced than that offered by the competition. Competitiveness is a term frequently found in the literature on business strategy concerning situations where a few firms are engaged in zero- or negative-sum competition with each other over market shares or profits. In this use of the term, there are clearly winners and losers in the "competitiveness" game. Economists are uncomfortable with this because it suggests that a nation that does not "win" the competition game must necessarily "lose." This perspective is completely contrary to the theory of comparative advantage, which states that all nations necessarily gain by engaging in free trade. Furthermore, according to comparative advantage theory, the fact that a country does not succeed in selling one type of product indicates absolutely nothing about the welfare consequences of international trade.

The competitiveness theme has received a lot of attention in the United States, where analogies between war and international trade fill the business press. America's trade deficit in the 1980s suggested that it was losing the competitiveness battle with the Japanese in particular and that this was going to have serious long-term consequences for U.S. productivity. Essentially the same set of concerns is being raised in Canada[1] today, and many of these have to do with the fundamental long-term determinants of productivity. All economists agree that high productivity growth is better than slow productivity growth, and that the pattern of productivity growth between industries will have an impact on the type of goods that are exported and imported. These and other aspects of the competitiveness issue are covered in other Council studies.

In addition to productivity, however, all businesses have to contend with changes in their costs due to other factors, including changes in the exchange rate, wages, and interest rates. For an open economy like Canada, the exchange rate is *the* fundamental macroeconomic price, which impacts directly on international trade. This study is an attempt not only to summarize the debate on the determinants of the exchange rate, but more importantly to explain how the exchange rate affects the cost structure of domestic exporters and importers versus their foreign counterparts. In addition to the exchange rate, the study focuses on the aggregate indicator that receives the most attention as a proxy for "competitiveness" – the external balance of the nation, both the trade balance and current account balance. A few words in defence of this particular emphasis are probably in order.

First, the determinants of external balance is the area where the current controversy among economists is greatest. Most of the debate concerns the relative importance of alternative macroeconomic determinants of the external balance and the particular roles played by the exchange rate, monetary policy, and fiscal policy in determining the external balance. Obviously the external balance is only one measure of international competitiveness, as the term is commonly used. From a welfare or long-term growth perspective, the external balance is not an appropriate end in itself. Countries with strong growth often have long periods when they run current account deficits. While not denying the importance of this type of consideration, in the interests of defining the scope of the project, it was necessary to limit the set of issues to be taken under consideration. Thus the general role of capital accumulation and its effect on productivity are not treated in this study.

The link between exchange rates and external balance is one taken for granted by most observers; yet, as we shall discuss below, this link is far from obvious. At the same time, the most suitable theory of exchange-rate determination is equally uncertain. Nevertheless, practical concerns with the substantial swings in the Canadian exchange rate over the 1980s and the recent deterioration in Canada's external balance have sparked considerable public debate

on the impact of exchange rate on the performance of the Canadian economy. This study is an attempt to bring some light to that debate. The remainder of the chapter discusses in greater detail the Canadian policy debate on the exchange rate and the academic debate on the link between the exchange rate and "competitiveness." A concluding section summarizes the contents of the chapters containing the major results of the study.

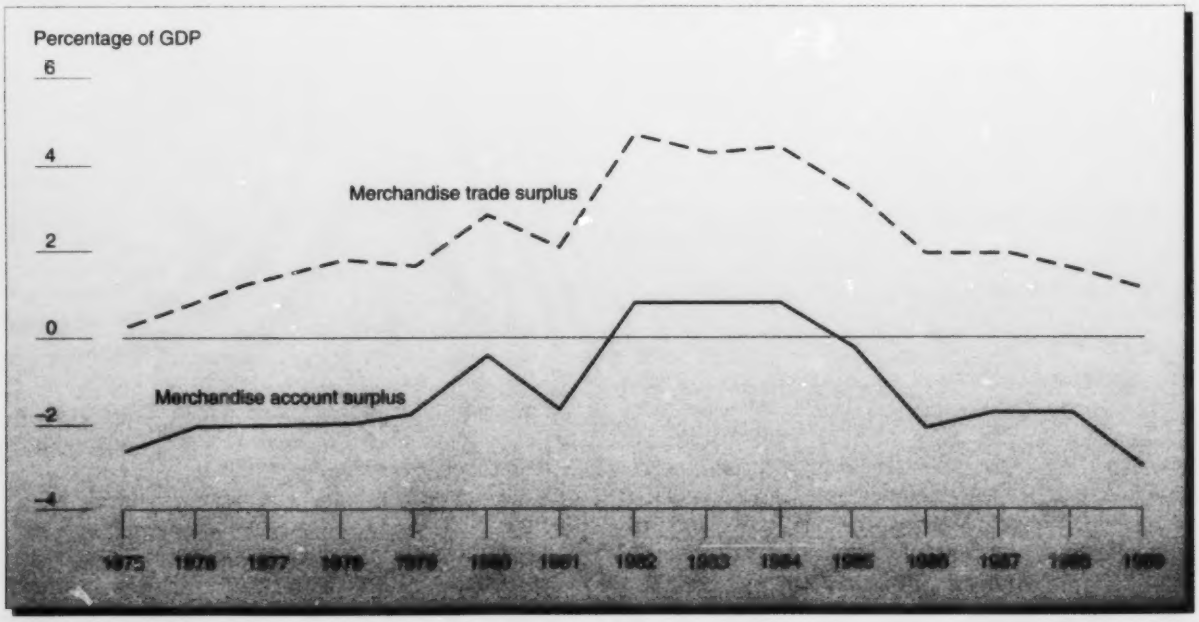
The Canadian Policy Debate

The Canadian debate starts with the external balance charted in Figure 1-1. In this chart, the current account as a percentage of gross domestic product (GDP) is plotted on an annual basis. After spending most of the 1970s in deficit, it reached a surplus position in 1982-84 and has since moved to a significant deficit position, reaching about 3 per cent of GDP by the end of 1989. Also charted is the merchandise trade surplus as a percentage of GDP. This is a more narrow measure of trade performance, as it excludes service transactions and income paid to and received from foreigners as a result of the asset position between Canadians and foreigners. Canada as a whole is a net debtor relative to the rest of the world, and thus dividend and interest payments generally flow out of Canada to foreigners; thus the current account surplus is invariably smaller than the merchandise surplus. Like the current account, the merchandise trade surplus deteriorated significantly over the 1984-89 period after improving for close to a decade.

The link between exchange rates and current account balances is often weak, as will be discussed in Chapter 3. Nevertheless, economists associate the external performance of the economy with movements in the nominal exchange rate. The exchange rate that receives the most attention is the rate of exchange between Canada and the United States. In Figure 1-2 the bilateral Canada-U.S. exchange rate expressed in Canadian cents per U.S. dollar is graphed for the period 1972-89. Both the nominal and real bilateral exchange rate are plotted. Since so much of Canadian trade is with the United States, the exchange rate will be assumed to refer to the Canada-U.S. bilateral rate unless stated otherwise. During this period, there were wide swings in the real and nominal exchange rate. Looking at the 1980s alone, the Canadian dollar debuted at approximately 120 and depreciated to as low as 144.9 at one point in 1986, a net depreciation of about 21 per cent. It then steadily appreciated over the rest of the decade. In the summer of 1990, during the invasion of Kuwait by Iraq, it reached a high of more than

Figure 1-1

Measures of external balance, current account and merchandise trade surplus, 1975-89



89 cents U.S., or in the units used in Figure 1-2, a value of 112.3. This represents a net appreciation of the Canadian dollar expressed in U.S. dollar terms of about 29 per cent.[2]

When comparing Figures 1-1 and 1-2, the real exchange rate (the Canadian dollar price of foreign exchange adjusted for price levels) appears to follow the external deficit fairly closely. While this link is one many people take for granted, it is deserving of further scrutiny.

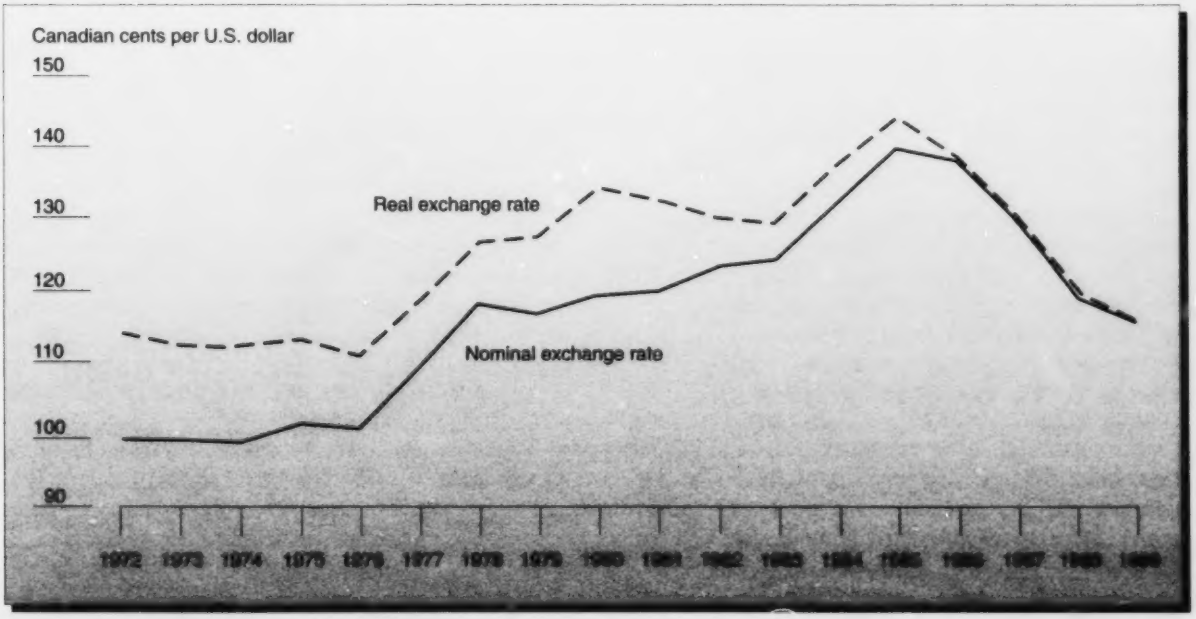
The exchange rate debate has been confounded in part with the debate on the impact of the 1988 Canada-U.S. Free Trade Agreement (FTA). The deterioration in the Canadian manufacturing sector and current account since 1988 is cited by many as a consequence of the FTA; the dramatic increase in imports and some relocation of plants to the United States are taken as evidence of fundamental structural problems brought about by the FTA. Several other economists have indicated that these problems are due to the high Canadian dollar and/or high Canadian interest rates, offering causal explanations based on perceptions about the working of macroeconomic policy in Canada and Canada's major trading partners. It is too early to state definitively which of these explanations is the more plausible, although most economists think the FTA has been in place far too short a time to have had much impact – either positive or negative – on jobs and investment.

By the end of the 1980s, a number of business and labour groups were expressing considerable frustration with the performance of the Canada-U.S. dollar exchange rate, mirroring in part the frustration evident among the G-7 countries over the performance of the major international exchange rates relative to the U.S. dollar, the German deutsche mark, and the Japanese yen in the early part of the 1980s.

Just how important are exchange rates in the competitiveness debate? The orders of magnitude are suggested by Figure 1-3. Here the three basic components of competitiveness in terms of costs are illustrated – the exchange rate, relative wage rates, and relative productivity. The graph shows a comparison between Canadian and U.S. manufacturing over the period 1972-88.[3] As can be seen, the swings in relative productivity are substantially less than the swings in either relative wages or the exchange rate. In comparing wages against the exchange rate, a couple of simple statistics are indicative. Considering the variance in exchange rates calculated on an annual basis relative to the variance in relative wages, the ratio is 1.14. This suggests that movements

Figure 1-2

Nominal and real exchange rates, bilateral Canada/United States, 1972-89



SOURCE Based on end-of-year rates in Cansim database.

in the exchange rate have been more pronounced than movements in relative wages. Whatever the reason, there is little doubt that the exchange rate has been the most influential determinant of changes in competitiveness over the last two decades. In the 1980s alone, the swings in the exchange rate have been even more pronounced relative to wages.

Another important element in both the international and Canadian debate is the evidence of exchange-rate volatility in the floating-rate period. It has frequently been noted that real exchange rate variability has been more pronounced in the floating-rate period for the major currencies. Marston [1986] observed that exchange rates during the floating-rate period have been more than twice as volatile as relative national prices, measured by any of the broad-based national price indexes such as the Consumer Price Index or the GDP deflator. Thus the volatility of real exchange rates is clearly due to nominal exchange-rate movements and is not simply a reflection of greater variability due to higher and more uncertain inflation rates over the same period. As Figure 1-1 indicates, the volatility of the Canadian exchange rate became even more pronounced during the 1980s. In Figure 1-4 the monthly percentage changes in the bilateral Canadian/U.S. rate are indicated. The month-to-month changes in the exchange rate are often around 2 per cent. This volatility has been a source of concern to Canadian exporters and importers, and in the early 1980s it was the source of trade friction with the United States, including a number of actions against the Canadian steel industry and the infamous softwood lumber case. In each case, the U.S. industry involved pointed to the apparent subsidy of Canadian exports as a form of "unfair" competition, but the more probable source of the problem was a loss in U.S. competitiveness relative to the Canadian industry due to the substantial depreciation of the Canadian dollar during the early 1980s.

In addition, the volatility in exchange rates makes investment decisions more difficult in terms of both long-term planning based on international cost comparisons and assessments of the risk on the return to investment induced by volatile exchange rates. For both reasons, it has been charged that exchange-rate volatility has reduced the efficiency of international trade based on the principle of international comparative advantage between nations. Instead, it is argued that trade flows increasingly reflect exchange-rate shifts caused by the apparent aimless flow of short-term financial capital from one currency to another. The volatility is simply a reflection of just how aimless those capital flows are.

The policy debate on the exchange rate has more or less marked time over the past few years. Concerns about both the volatility and level of the exchange rate have been raised, but few concrete alternatives have been proposed to existing arrangements. The Bank of Canada, for its part, has insisted on price stability as the principal aim of monetary policy, leaving its views on the exchange rate more or less unstated. On a global scale, there is an ongoing debate over the performance of the floating exchange-rate system, and a number of proposals have been put forward. At the moment, however, there seems to be a lack of willingness on the part of the major countries to change the existing system. The one major development is the planned monetary union of the ECC countries under the EMS arrangements. This has sparked lively debate within Europe on the merits of fixed versus flexible exchange-rate systems. Many of the issues discussed in this study have also been debated in the context of the EMS and European economic performance.

The Academic Debate

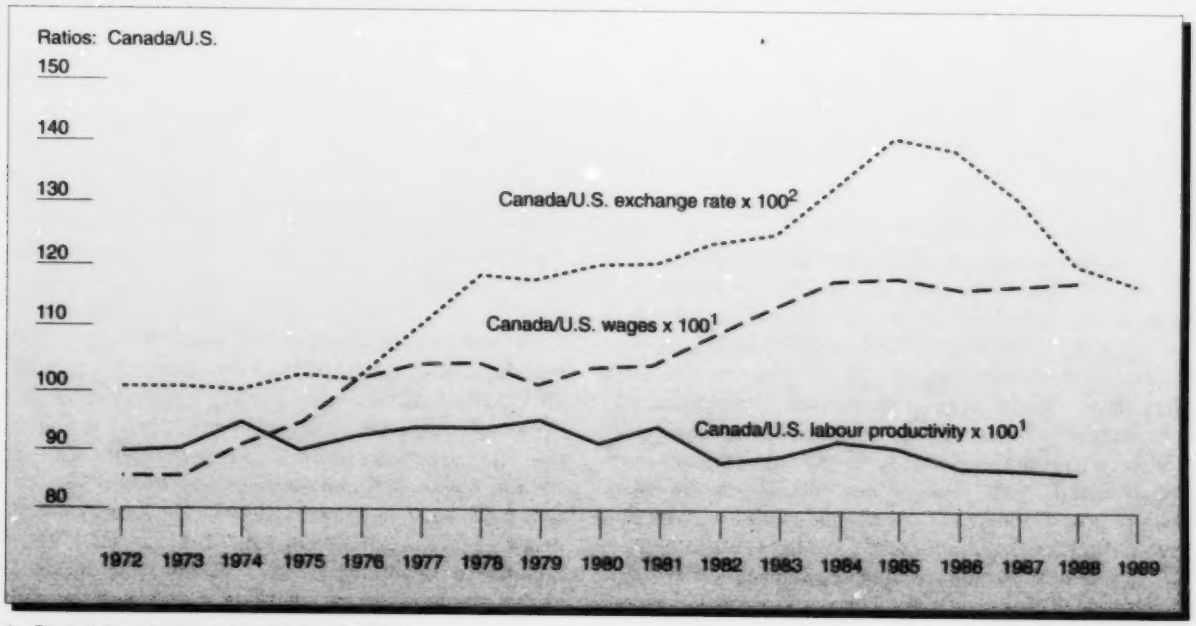
The state of affairs is no less settled in the professional debate on the determinants of the exchange rate, the external balance, and the relations between the two.

In the early 1980s, a fairly remarkable consensus emerged among academics regarding the appropriate macroeconomic model for external balance. This was a "synthesis" model rooted in the Mundell-Fleming tradition of open economy macroeconomics, with modifications incorporating dynamics of wages and prices, portfolio balance effects on exchange rates and asset flows, and sophisticated assumptions regarding the role of information and the formation of expectations in both goods and asset markets.[4] This view, a product of the oil-shock period, emphasized both supply shocks and mechanisms for the international transmission of inflation, together with an emerging appreciation of the extent of the global integration of financial markets and the role of exchange-rate changes. The synthesis view attached great importance to the real exchange rate as the key relative price that responded to balance-of-payments disequilibrium. The real exchange rate is the nominal exchange rate corrected for relative changes in the price levels of the two countries in any bilateral comparison. Changes in the real exchange rate alter the relative competitiveness of two economies by altering the relative price at which they produce goods and services. The traditional view is that a *real exchange-rate appreciation* will reduce exports and increase imports, leading to a deterioration in the trade balance.

The synthesis view was upset in the early 1980s by the remarkable appreciation and subsequent depreciation of the U.S. dollar vis-à-vis the yen and the European currencies,

Figure 1-3

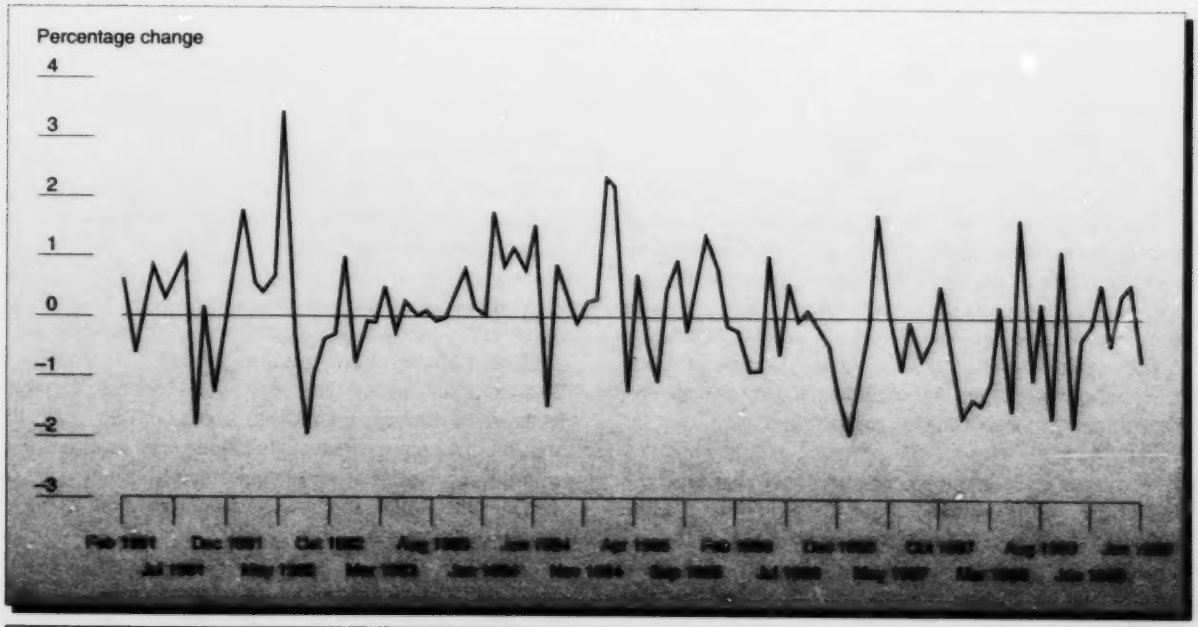
Components of competitiveness, 1972-89



1 Productivity and wages expressed as percentages.
2 Exchange rate expressed as cents per U.S. dollar.

Figure 1-4

Volatility of Canada/U.S. exchange rate, 1981-89



together with the large and persistent trade deficit of the United States. A large set of explanations were offered for these events, including some traditional explanations based on the synthesis view, but by and large the orthodox view was seriously challenged. Among the issues raised were the source of the U.S. dollar appreciation, the reason the dollar continued to appreciate in the face of massive U.S. trade deficits, and the failure of the subsequent depreciation of the dollar to lead to a more marked improvement in the trade deficit.

In addition to the particular impetus given to the debate by the U.S. experience, investigators were completely unable to confirm the basic efficient asset market approach to exchange rates, which was at the heart of the orthodox view on exchange-rate determinants. According to the efficient asset market theory, at any moment in time the exchange rate accurately reflects the best information available on both long-term and short-term economic fundamentals. The theory assumes that investors have *rational expectations* with respect to future and current but unknown developments; that is, investors understand how the world economy works and thus how basic economic variables will evolve in response to changes in the underlying environment. The theory provided the crucial link between the relative economic performance of countries and the portfolio decisions of international investors. Exchange-market speculation according to this theory is inherently stabilizing, in that exchange rates are always driven back to those values consistent with the economic "fundamentals."

One study after another has either rejected outright or failed to accept in any definite way the basic asset market approach to exchange rates.[5] As of the mid-1980s, the economics profession was left in the awkward position of having no theoretical model of exchange rates which "worked" in even a remotely adequate way, although economists for the most part defended the floating exchange rate system as one consistent with both the efficient allocation of resources internationally and the preservation of national autonomy over monetary policy. The response of the profession to this state of affairs has been to go in a variety of directions. In each case the development reflects a reaction to both external events (the U.S. trade deficit and dollar appreciation) and to the empirical inadequacy of orthodox asset-pricing models of the exchange rate.

The first of these developments, which we shall label the "inefficient exchange market" hypothesis, asserts that the exchange rate can become decoupled from reality for significantly long periods of time, exhibiting both substantial volatility and speculative rises and falls far beyond that consistent with fundamentals. The set of people supporting such a view range from global monetarists such as Ron McKinnon to crisis theorists such as Robin Marris and neo-Keynesians such as Rudi Dornbusch, Paul Krugman, and James Tobin. What differentiates this position from the orthodox position is a denial of the *rational expectations hypothesis* in the case of the foreign-exchange markets. On the contrary, it is assumed that irrational destabilizing speculation can become the driving force in exchange markets for considerable periods of time. The *inefficient exchange market* theorists usually assume, in addition, that the external balance is sensitive to changes in the real exchange rate, although there is considerable debate as to the nature of the lags in this presumed link.[6]

The second approach that grew out of the early 1980s experience has been dubbed the "new classical approach." It follows the classical economists in emphasizing flexible market-clearing models, but it is "new" in that it emphasizes the gap between national savings and national investment as arising from the decisions of consumers to save, on the one hand, and the decisions of producers to invest in new and replacement capital goods, on the other. For the most part, it is a theory of the real exchange rate and denies any role for monetary effects on the economy in either the short or long run. Its great power theoretically is that it forces one to think very carefully about budget constraints and the microeconomic foundations of macro behavioural equations. The proponents of this view are for the most part silent about the nominal exchange rate. Many critics dismiss this approach out of hand. The empirical support for the new classical approach to the current account, however, is not easily dismissed. Exogenous movements in government deficits or investment booms, for example, are important determinants of external balance. One piece of evidence often used to support this approach is the claimed weak association between net exports and real exchange rates (for example, see Frenkel and Razin [1990]). This is not so much an argument in favour of the new classical school as it is an attack on the assumed real exchange rate links used in most Keynesian models.

In addition to these two major developments, there has developed a substantial literature on exchange-rate misalignment – how far away exchange rates stand from their "fundamental" or equilibrium values and how this misalignment affects the allocation of resources both domestically and internationally.[7] Part of this study will be concerned with the basic question of what is the equilibrium value of the Canadian dollar, and how one might go about trying to answer this question.

In addition, there has been a considerable amount of work on the short-term transmission mechanism linking exchange

rate changes to changes in prices, investment, and trade flows. This is clearly not a new theme, but a number of new ideas have been offered in recent years on why the link may not be as simple as the orthodox theory presumed.

Summary

The principal focus of the study is the role of the exchange rate in determining external balance and adjustments to external shocks. The context is specifically the Canadian economy over the last two decades, with its unique structural characteristics. These include the importance of regions within Canada, the large role of resource exports to the economy, and the particular role that Canada plays vis-à-vis the U.S. economy. Throughout the study, the exchange rate is defined as the bilateral Canada-U.S. rate. At various points attention will be paid to other bilateral rates, but the policy concerns are both less pressing and less relevant in looking at Canadian dollar-yen and Canadian dollar-deutsche mark rates. Whatever policy Canada undertakes, it is unlikely to influence the major bilateral rates between the United States and other countries. As the United States is by far our largest trading partner, the focus on this exchange rate is easily justified.

The study is more concerned with the impact of the exchange rate on the economy than with its determinants. Focusing on the latter question would involve addressing the large and unresolved debate on the "efficient exchange market" hypothesis. Determining the influence of the exchange rate on trade volumes, the pattern of trade, and domestic and international prices is crucial to an appropriate perspective on longer-run competitiveness issues because of the fundamental identification problem – i.e., distinguishing between changes in competitiveness due to long-term relative changes in productivity or factor abundance and changes due to macroeconomic factors – including external shocks (e.g., the oil-price shock of the late 1970s). Confusion of this kind is abundantly clear in the debate on the U.S. trade deficit, with one group citing the quality of U.S. management and labour as the fundamental source of the problem and other groups identifying the U.S. fiscal deficit as the factor crowding out exports.

A fundamental starting point in international economics is the equilibrium value of the real and nominal exchange rates. Discussions of exchange rate over or undervaluation are meaningless unless there is some benchmark by which they can be judged – even assuming such definitions are themselves meaningful. Over the years, there has been considerable debate on this subject, and this will be reviewed in this study. The focus of Chapter 2 will be the major concepts economists have used to define "equilibrium exchange rates" and what they tell us about the current state of the Canadian dollar. Here the subject ranges from theories of purchasing power parity to concepts of equilibrium exchange rates based on balance-of-payments equilibrium concepts. The chapter concludes with an examination of what can be said about the potential misalignment of the Canada-U.S. dollar exchange rate relative to its fundamentals during the 1980s.

In Chapter 3, attention shifts to the external balance. Basic theory is reviewed here, and the role of the exchange rate in determining external balance is discussed. Considerable emphasis is given to the equilibrium or new classical approach to the current account, which identifies the current account as the difference between national savings and national investment. Empirically, we look at the behaviour of the Canadian current account and its components over the 1980s and ask to what extent the evidence is consistent with equilibrium theory. The general conclusion is that some of the movement in the current account must be attributed to independent movements in the exchange rate.

Chapter 4 pursues a number of the recent themes regarding the short-run effects of exchange rate changes. These include the debate on the role of "exchange rate pass-through" – that is, whether exchange-rate changes affect international prices, as the law of one price suggests. The debate on hysteresis in trade patterns is reviewed, although the evidence is found to be inconclusive. Trade hysteresis is the idea that loss of competitiveness in a particular sector, perhaps due to an overvalued exchange rate, may become permanent – that is, it cannot be reversed by inducing the exchange rate to return to its equilibrium value. This is a concept we shall no doubt hear more of in Canada as a result of the 1990-91 recession in manufacturing. Finally, Chapter 4 summarizes a statistical study on the response of industry employment in 20 two-digit manufacturing industries to real exchange-rate changes.

The concluding Chapter 5 is a summary of the major results of the research. It is recommended for those not interested in the details of the debate or the more technical analysis. In addition, Chapter 5 presents the policy implications of the study. Generally, it is concluded that many of the questions raised in this chapter regarding the adverse impact on competitiveness of exchange-rate movements appear to be legitimate, and therefore policy concerns about the exchange rate are justified and deserve greater attention within the general macroeconomic policy framework.

2 Equilibrium Exchange Rates

A fundamental starting point in international economics is the equilibrium value of the real and nominal exchange rates. Discussions of exchange rate over- or undervaluation are meaningless unless there is some benchmark by which they can be judged. Over the years, there has been much debate on this subject, and the extensive literature on the subject will not be reviewed in detail here.[1] However, the major concepts economists have used to define "equilibrium exchange rates" will be reviewed, as well as what they tell us about the current state of the Canadian dollar.

Absolute Purchasing Power Parity

The longest standing theory of exchange rate fundamentals is purchasing power parity (PPP). Although much maligned, it is still widely used by international investment analysts and monetarists as a predictor of the long-run nominal exchange rate.[2] On a bilateral basis one starts with price indexes for home and foreign national output denoted by P and P^*. These indexes in empirical work are often GDP deflators, consumer price indexes, wholesale price indexes, or labour cost measures. In the spirit of the original PPP doctrine, either GDP indexes or consumption deflators such as the Consumer Price Index (CPI) make the most sense as the broadest possible measure of the price level for a country's national output. According to the theory, in the long run the nominal exchange rate E (the Canadian dollar price of foreign currency) should equal the ratio of the foreign to home price index. That is, $E = P/P^*$.

One problem in using any pair of price indexes is to pick an appropriate base year for determining PPP levels. It is often argued that PPP only makes sense when applied to tradables and that corrections should be made for differences in expenditure patterns across countries. In the literature on international income comparisons, a great deal of effort is expended on such detailed corrections (see Kravis et al. [1982] for a summary).

A representative Canadian-U.S. bilateral PPP series using relative CPIs as deflators is listed in Table 2-1; the table also lists the underlying price level indexes and nominal exchange rate data. The PPP value or the dollar is normalized to US$1 in 1974. This was arbitrarily chosen, given that the external balance had been stable for most of the 1960s, as had been both the inflation rate and nominal exchange rate until that year. The picture for the subsequent two decades does not change much as a result of choosing different base years prior to 1974. Both the PPP exchange rate and nominal exchange rate are graphed in Figure 2-1.

The basic picture drawn by these and other PPP calculations is indicated in the last column of Table 2-1, showing the extent of misalignment of the actual exchange rate vis-à-vis the PPP rate. Basically, the data indicate that since 1977 the Canadian dollar has been undervalued on a PPP basis, with the undervaluation reaching a maximum of 27 per cent in 1985. The subsequent nominal exchange depreciation against the U.S. currency reduced the PPP by the end of 1989 to about C$1.12. Inflation differences over 1990 imply that at the end of 1990 the PPP rate was close to 1.14-1.15. Using a number of broad-based price indexes, the equilibrium value of the Canadian dollar works out to approximately $1.10-1.15. This indicates that the current exchange rate of $1.15-1.16 (spring of 1991) is not far from its long-run value. As I will point out in subsequent sections, this runs counter to other views on the equilibrium exchange rate based on different methodologies.

One reason to be very cautious about the use of these PPP numbers to indicate the true extent of misalignment is the fundamental problem of choosing a base year and making certain that the commodity bundles being compared across countries are comparable. There is a sizable literature on this problem, which is summarized in Kravis et al. [1982]. The basic thrust of this research is to make detailed comparisons of commodity groups and prices between countries and then to construct PPP indexes that are more reflective of true price/commodity comparisons than traditional aggregate published price indexes. The United Nations *International Comparison Project* [1987] has reported detailed PPP indexes by product, with 1980 being the most recent year available. Hooper and Larin [1989], using more recent expenditure weights than in the CPI project, calculated the 1980 PPP value for the U.S.-Canadian dollar rate at 117. For 1980, this represents a much more accurate estimate of true PPP than is available by picking arbitrary base years and using subsequent inflation rates to impute a PPP value. Note that in Table 2-1 the estimated PPP value for 1980 is 100.7; thus the Hooper-Larin estimate the for 1980 PPP value of the Canadian dollar is about 16 per cent lower than the simple index reported in Table 2-1. Assuming that

Table 2-1

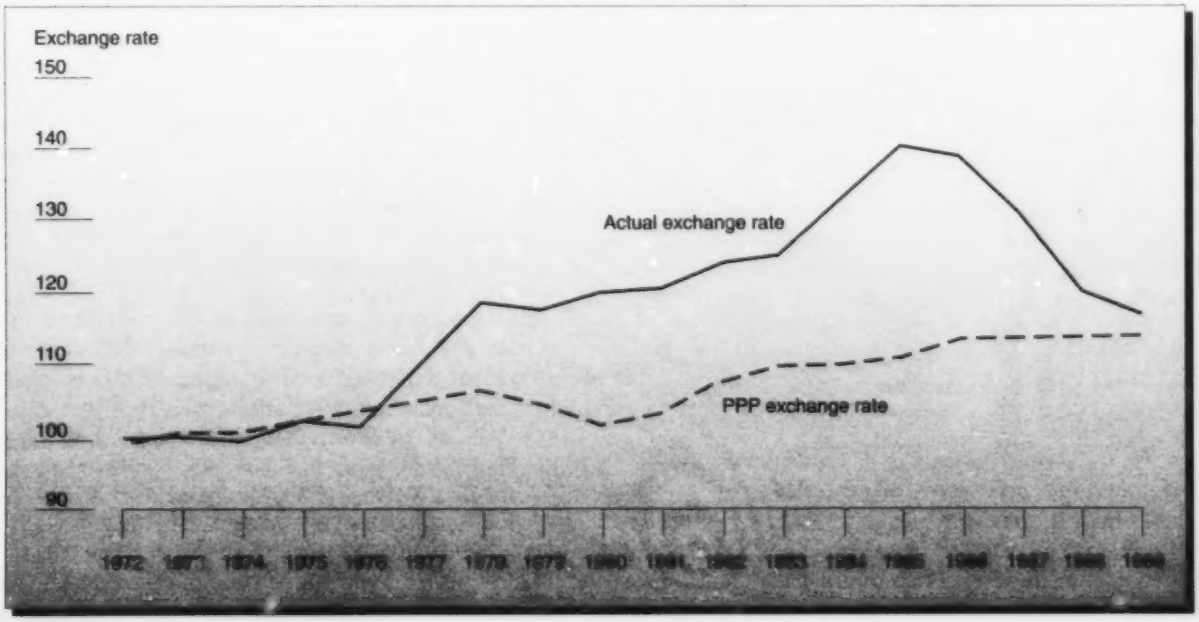
Canadian versus U.S. price indexes and exchange rates, 1972-89

	Canadian CPI	U.S. CPI	Canadian/U.S. exchange rate	PPP exchange rate	Real exchange rate	Percentage misalignment
	(1981 = 100)	(1980 = 100)	(C/US $)	(1974 = 100)		(+ undervalued)
1972	44.20	50.73	99.56	98.71	101.75	0.86
1973	47.60	53.89	99.58	100.07	100.39	–0.49
1974	52.80	59.82	99.12	100.00	100.00	–0.88
1975	58.50	65.31	101.64	101.48	101.04	0.16
1976	62.90	69.10	100.92	103.13	98.73	–2.14
1977	67.90	73.60	109.44	104.52	105.64	4.71
1978	73.90	79.20	118.10	105.71	112.71	11.72
1979	80.70	88.10	116.81	103.78	113.56	12.56
1980	88.90	100.00	119.47	100.72	119.67	18.62
1981	100.00	110.40	119.89	102.62	117.86	16.83
1982	110.80	117.10	123.37	107.20	116.11	15.08
1983	117.20	121.78	124.44	109.03	115.14	14.13
1984	122.30	127.04	132.14	109.07	122.23	21.15
1985	127.20	131.15	139.75	109.88	128.31	27.18
1986	132.40	133.07	138.05	112.73	123.55	22.47
1987	138.20	139.00	129.98	112.64	116.42	15.39
1988	143.80	144.53	119.27	112.72	106.75	5.81
1989	150.99	151.50	115.78	112.91	103.45	2.54

NOTE PPP based on relative CPIs. Misalignment based on actual exchange rate relative to PPP exchange rate.

Figure 2-1

PPP exchange rate versus actual exchange rate, Canada-U.S. bilateral exchange rate, 1972-89



NOTE PPP computed using CPIs of both countries.

the structure of prices and commodity comparisons did not change greatly during the 1980s, other than through changes in the general level of prices, the "true" PPP index would be about 16 per cent higher than the index reported in Table 2-1. This would imply, for example, that the 1989 PPP rate was approximately 130. Thus this type of PPP calculation indicates that the 1989 Canadian dollar was substantially overvalued rather than being undervalued. It is unfortunate we do not have more recent detailed PPP calculations, such as those provided by the CPI. It would seem prudent, however, to regard the PPP misalignment estimates in Table 2-1 with considerable skepticism.

The Real Exchange Rate

It is now routine to calculate the **real exchange rate** and to discuss the fundamentals determining the real exchange rate. Unfortunately, economists use the term "real exchange rate" rather loosely, and it has come to be used both theoretically and empirically in a wide variety of ways. Before getting into the details of these alternative indexes of the real exchange rate, it is useful to consider the most commonly used aggregate measure of the real exchange rate. The empirical definition of the real exchange rate attempts to capture broad shifts in aggregate competitiveness as a result of shifts in nominal exchange rates and price levels.[3]

A standard definition of the "real exchange rate" (bilateral) is the rate at which one unit of a country's GDP can be exchanged for a unit of another country's GDP. Conceptually, it involves selling one unit of GDP in one country, taking the proceeds, and purchasing a representative GDP bundle in the other country. The real exchange rate R is thus defined as

$$R = EP^*/P. \tag{2.1}$$

Note that if PPP theory were the correct determinant of nominal exchange rates, R would necessarily equal 1. It is argued that the real exchange rate is determined by "real" factors, not monetary or financial factors. Thus it ought to be more stable than nominal exchange rates. Figure 1-2 is a graph of the real aggregate Canada-U.S. exchange rate versus the nominal exchange rate. It can be seen that the two move remarkably in parallel. Thus both volatility and trends in nominal exchange rates are reflected in the patterns evident in real exchange rates. Seeking a theory of the "equilibrium" real exchange rate is just as difficult as seeking an equilibrium value of the nominal exchange rate. The concept of the real exchange rate is nevertheless useful, because it allows us to distinguish between changes in relative price levels and nominal exchange rate changes as the source of important relative price changes. Economists now agree that PPP is oversimplified and that a number of real factors cause the real exchange rate to shift over time. The misalignment of exchange rates should be judged relative to a norm that includes corrections for the changes in the underlying real exchange rate. These corrections include changes in such things as relative productivity differences between countries and changes in the terms of trade. A more sophisticated view of the misalignment of exchange rates focuses on the observed misalignment in aggregate real exchange rates. As noted in Neary [1988], however, the concept of an equilibrium real exchange rate depends upon the model of the economy and underlying notion of equilibrium being used. In the context of a specific model, we shall investigate what can be said about the equilibrium real exchange rate for Canada.

The Equilibrium Real Exchange Rate – Correcting for Productivity Changes

An important consideration in determining trends in the real exchange rate is relative trends in productivity.[4] Let the home price index P be defined by a geometric index of traded, P_T, and nontraded, P_N, prices. The *aggregate real exchange rate* is then defined as

$$R = EP_N^{\alpha} P_T^{1-\alpha} \,/\, P_N^{\alpha^*} P_T^{1-\alpha^*}. \tag{2.2}$$

Let us now assume that the economy has a production structure that is adequately described by the Ricardian trade model,[5] with a_N and a_T indicating the respective labour productivities in the nontraded and traded goods sectors. In the Ricardian model, relative prices between all sectors are independent of output levels and defined by relative labour productivities between sectors. Under competitive equilibrium with interindustry labour mobility, it is necessarily the case that, given a wage rate W, prices must equal unit costs, or $P_N = W/a_N$, $P_T = W/a_T$. Similar equations hold for the foreign country. Under the law of one price for tradables, we have $P_T = E\,P^*_T$. Substituting these into equation (2.2) and taking logs, we get the following equation for the (log of the) real exchange rate.

$$r = \alpha\,[\log a_N - \log a_T] - \alpha\,[\log a^*_N - \log a^*_T]. \tag{2.3}$$

The real exchange rate defined by equation (2.3) should be viewed as a long-run exchange rate since it involves using both the law of one price in traded goods and interindustry factor price equilibrium. The main advantage of this particular formulation of the real exchange rate is that it allows the real exchange rate to be expressed in terms of real variables only. It shows that trends in the real exchange

equilibrium exchange rate can be explained by differential trends between countries in relative productivity in the traded and nontraded goods sectors. It is useful to rewrite (2.3) as:

$$r = \alpha \left[\log a_N - \log a_N^*\right] - \alpha \left[\log a_T - \log a_T^*\right]. \qquad (2.4)$$

This form of the real exchange rate equation shows the differing role of productivity change in the nontraded and traded goods sector. Productivity increase in the traded sector relative to the trading partner implies the equilibrium real exchange rate will appreciate; thus high productivity growth in tradables implies an appreciating exchange rate. The opposite occurs in the nontradables sector. There, relative productivity growth implies the equilibrium real exchange rate will depreciate.

There are now a number of studies on international differences in productivity in manufacturing industries.[6] The Economic Council provided the author with their own estimates of relative Canada-U.S. productivity in manufacturing, which is used to proxy productivity in the traded goods sector. Over the period 1975-89, the ratio of labour productivities a_T/a^*_T went from 100/122.8 to 100/134.0.[7] Thus labour productivity in Canada measured against U.S. labour productivity has fallen from 84 to 74.6 per cent in the tradable sector. *Assuming that productivity levels in the nontraded sector were the same in both countries, this implies that the equilibrium real exchange rate over the period 1975-89 depreciated by about 3.7 per cent.*[8]

Thus even though relative labour productivity fell significantly, the aggregate real exchange rate, given a weight of about one third in the total price index of both countries, would have depreciated about 3.7 per cent. If the 1975 real exchange rate observed in Figure 1-2 can be taken as being close to its equilibrium value, then the current real exchange rate, at about 105-107 at the end of 1990 (1974 base of 100), is only slightly below its equilibrium value, assuming no other relative productivity corrections.

That is not the end of the story, however. Obviously important in this calculation are trends in nontraded productivity. Here conclusive evidence is much more difficult to obtain, for well-known reasons dealing with the estimation of productivity in the service sectors. However, Rao and Lemprière [1990], using a consistent methodology, report labour productivity growth over the 1974-85 period in a matched set of similar Canadian and U.S. nonmanufacturing industries. We use these industries as a proxy for nontradables. Rao and Lemprière report labour productivity growth in Canada over this period at an annual rate of 0.8 per cent; for the same U.S. aggregate, they report an annual productivity growth rate of 0.3 per cent. This indicates that, over the period, Canadian productivity grew faster by one half a percentage point per annum and that, over the period 1975-89 (14 years), the cumulative productivity change was approximately 7.5 per cent. Weighting this by the share of nontraded goods in the economy suggests that the equilibrium real exchange rate, *ceteris paribus*, depreciated over the period by 5 per cent. *Note that the relative productivity growth in Canada in the nontraded sectors relative to the United States implies additional real exchange rate depreciation beyond that predicted by productivity trends in manufacturing industries.*

The sum of the two productivity effects suggests a real equilibrium depreciation of about 8.7 per cent over the period. Therefore, on a 1975 base of 101, the suggested real equilibrium exchange rate for 1989 is about 110. This is surprisingly close to the observed 1989 real exchange rate of 103.45 listed in Table 2-1, suggesting moderate fundamental misalignment according to the theory underlying this particular calculation. *As of the end of 1989, the real exchange rate corrected for productivity trends appears to be overvalued by about 6.3 per cent. This would suggest that the nominal exchange rate is misaligned by approximately the same amount and that the equilibrium level of the Canadian dollar is about C$1.23 (or 81 cents U.S.).*

The extent of misalignment was much more dramatic in the early part of the 1980s, however. By 1985, the real exchange rate had depreciated to a low of 128 (see Table 2-1). Using the productivity trend reported above, the equilibrium real exchange rate in 1985 would have been in the neighbourhood of 106-107. Apparently, therefore, the Canadian dollar was undervalued by as much as 20 per cent during this period. What is remarkable is that in a period of four years the Canadian dollar went from being undervalued by as much as 20 per cent to being overvalued by about 6 per cent, according to the theory. This is rather surprising.

The basic theory used here presumes that labour markets *are in long-run equilibrium*. Competitiveness problems are a combination of productivity, exchange rate, and wage level problems. In the Ricardian model with the law of one price, relative wages in the two countries are tightly linked by the law of one price and price equal cost. That is:

$$W / W^* = a_T / a_T^* \times E. \qquad (2.5)$$

An independent test of the theory could be made by checking whether the latter equation tends to hold over the longer run.

Equilibrium Exchange Rates and the Terms of Trade

Another potentially important real change in underlying economic circumstances between countries over a fairly long period is changes in the terms of trade. From 1975 to 1989, the Canadian terms of trade improved by 12.7 per cent.[9] Some of this may be due to the fixed-weight nature of the index, but in aggregate terms it appears that, secularly, the terms of trade have moved in Canada's favour over this period. While the U.S. aggregate terms of trade underwent some fairly remarkable swings over the same period, largely due to oil-price changes and the dollar appreciation and depreciation over the 1980s, they generally show a similar improvement. In looking at the bilateral Canada-U.S. rate, it is important to correct for those terms-of-trade changes which affect the two countries asymmetrically. To be more precise, using equation (2.1) defining the real exchange rate, the traded goods price index P_T will be different for the two countries depending upon the composition of their trade. Probably the most important difference between Canada and the United States is that about one third of the U.S. import bill is for oil; Canada, on the other hand, has changed over the period 1975-89 from an oil exporter to a country with its net energy trade in balance.

The details of corrections to the bilateral real exchange rate will depend on the nature of the model of the traded goods sector used. The orders of magnitude are not hard to discern, however. In terms of the GDP indexes, the fall in the real price of energy of about 65 per cent from 1980 to 1989 would basically have a neutral effect on the real Canadian GDP index, but would raise the U.S. real GDP index by about 8 per cent over the same period. Therefore, the real Canada-U.S. exchange rate should have depreciated in response to that change by about the same magnitude. This estimate may be on the high side, because it does not consider the induced substitution effects that accompany such relative price effects. On balance, therefore, *the real energy price changes of the 1980s should have caused a depreciation of the real exchange rate of about 7-9 per cent over the decade.*

The answer as to where this leaves the real equilibrium exchange rate as of the end of 1989 is problematic. One of the puzzles is the substantial real depreciation of the Canadian dollar prior to 1981. From 1975 to 1980, the oil-shock period, the real exchange rate depreciated by about 18 per cent. The theory would have predicted some real appreciation. One explanation is a difference in the adjustment lags of the two economies in responding to the oil shocks. It is even more puzzling when one realizes that other nonenergy raw materials prices also declined in real terms through much of the 1980s, after rising in real terms during the 1970s; on balance, this should have led to real appreciation in the 1970s and depreciation in the 1980s.

Considering the swings in commodity prices over the last two decades, the true equilibrium bilateral exchange rate will not be easy to determine. The problem is compounded by ongoing structural change in the two economies. A conservative position would be to argue that, qualitatively, the commodity price changes from 1975 to 1989 should have led to a Canadian dollar depreciation against the U.S. dollar. This implies that the estimates provided in the last subsection provide a lower bound to the overevaluation of the dollar at the end of 1989. They do not, however, tell us to what extent the dollar had become undervalued by 1981 as a result of the energy price shocks to the two countries' economies.

Other Definitions of the Real Exchange Rate

The definition of the real exchange rate used in the last section is only one of a number that have been proposed in the literature. Different definitions focus on different characteristics of the economy and the adjustment required to changes in international competitiveness. In this section, four alternative conceptions of the real exchange rate that appear in the literature, as well as their role in the reallocation of resources, are discussed. Table 2-2 lists the four series on an annual basis from 1972 to 1989. In Figure 2-2, the four alternative real exchange rates are graphed. In each case, an appreciation of the real exchange rate (a fall in the index) corresponds to a *loss of competitiveness.*

Ratio of Traded Goods Prices to Nontraded Goods Prices

This definition is based on the so-called dependent economy model[10] used by many economists, in which the economy is aggregated into two sectors – a traded goods sector and a nontraded goods sector. It is most useful in looking at a small open economy facing fixed and unchanged terms of trade. As the economy moves from a trade deficit to a trade surplus position, the economy has to shift resources away from the nontradables sector towards the tradables sector. This must be accompanied by an increase in the relative price of tradables to nontradables. Using the price index for services as nontraded prices and a GDP deflator to proxy traded goods, this index of the real exchange rate has been remarkably stable over the past 15 years.

Table 2-2

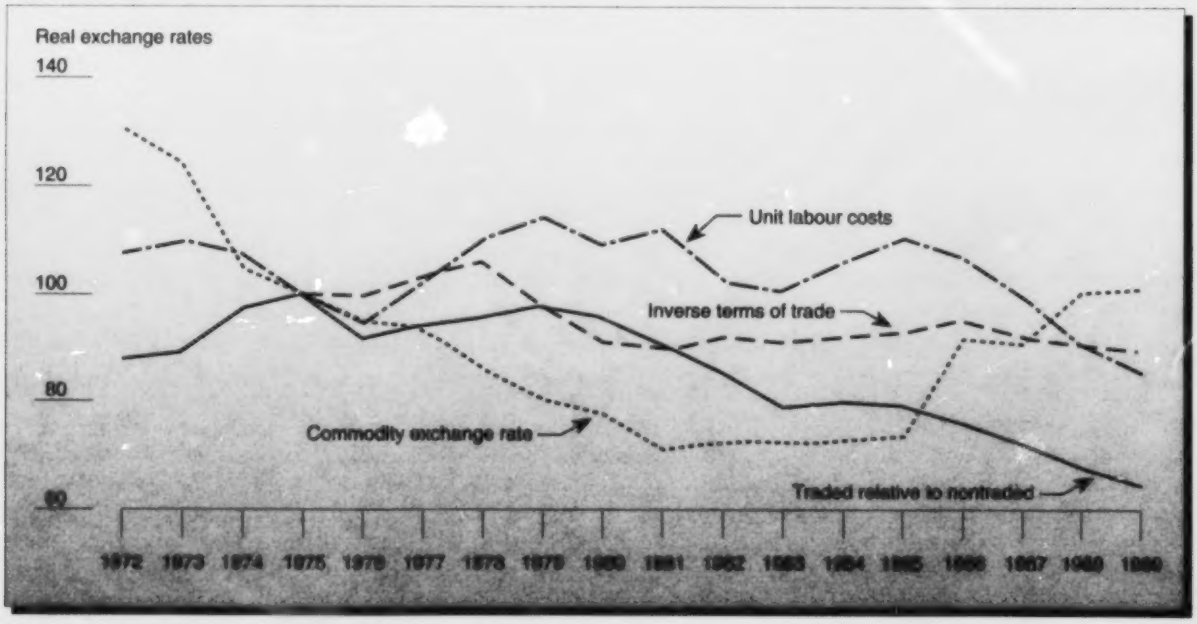
Alternative real exchange rates, 1972-89

	Traded to nontraded	Inverse total index	Inverse real commodity price	Relative unit labour cost
1972	87.90		130.70	107.24
1973	89.31		124.43	109.49
1974	97.54		104.90	107.20
1975	100.0	100.0	100.0	100.00
1976	91.69	99.16	94.89	94.09
1977	94.34	103.49	93.51	102.07
1978	95.53	106.04	86.19	109.82
1979	97.51	97.63	80.43	113.86
1980	95.54	90.63	77.83	108.58
1981	90.26	89.10	71.24	111.49
1982	85.35	91.86	72.61	102.22
1983	79.10	90.72	72.44	100.17
1984	80.14	91.51	72.58	105.67
1985	78.94	92.58	73.52	109.45
1986	75.84	94.80	91.54	106.34
1987	71.76	91.95	90.21	98.87
1988	67.18	89.94	99.68	89.61
1989	64.18	88.68	100.74	84.80

NOTE All real exchange rates are constructed such that an increase in the index corresponds to a real depreciation.

Figure 2-2

Alternative real exchange rates, 1972-89



NOTE An increase in index indicates depreciation.

The Inverse Terms of Trade

Another common definition of the real exchange rate is the inverse terms of trade for the economy – that is, the ratio of import prices to export prices. This definition came into common use in the 1960s and early 1970s as macroeconomists often used a model of the small open economy that assumed the economy specialized in the production of one good; thus a change in competitiveness necessarily meant a change in the relative price of exports to imports. It remains a useful definition if the principal external shock hitting an economy is a change in the relative price of exports to imports and if the nontraded sector is not too large relative to the traded goods sector. The relevance of this concept for Canada is questionable, however, given the large share of services in the economy. As indicated in Figure 2-2, the terms of trade have fluctuated somewhat within Canada, but nothing on the scale of the aggregate real exchange rate. As discussed earlier, the inverse terms of trade declined somewhat over the 1975-89 period, indicating a real exchange-rate appreciation according to this definition.

After improving in the 1970s with the resource boom, the Canadian terms of trade slipped about 7 per cent over the 1981-86 period; it subsequently recovered. Contrary to popular belief, the terms of trade have been relatively stable over most of the decade. Changes in the nominal exchange rate are at least partially responsible for this stabilization. From 1981 to 1986, the Canadian dollar depreciated substantially, cushioning the internal terms of trade for resource-based regions and industries. Since 1986, the Canadian dollar appreciation has been accompanied by an improving terms of trade, apparently because it lowered the relative price of imports.

The Real Commodity Exchange Rate

It has become customary to define sector-specific real exchange rates down to the level of the individual commodity or factor of production, traded or nontraded. Thus, for example, imagine a commodity i that is identified as being comparable between two countries (such as a "Big Mac"). Let p_i and p^*_i indicate the domestic currency prices of that commodity. The home country commodity real exchange rate is given by

$$R_i = Ep^*_i / p_i. \qquad (2.6)$$

These indexes can be computed on a variety of aggregation bases. It is often the case that broad-based external versus internal relative prices are corrected for exchange-rate changes. In Canada one obvious aggregate grouping is the resource sectors versus all others. The important issues connected with the manufacturing and resource sectors are prominent in virtually all economic policy discussions. Tables 2-3 and 2-4 contain relative shares of GDP and relative shares of exports by commodity groupings that isolate the relative importance of shifts in the resource sector. As indicated, the share of resources in GDP declined from 15 per cent in 1970 to about 9 per cent at the end of 1989. The share of resources in total exports has been somewhat more stable, but it too fell from 47 per cent in 1974 to about 33 per cent in 1989. Generally, the fall in real commodity prices over the 1980s led to a decline in the importance of resources in the economy.

The real commodity exchange rate is defined simply as the inverse of the ratio of raw materials prices in Canadian dollars to an aggregate price index for all commodities. As indicated in Figure 2-2, the real commodity exchange rate appreciated substantially during the 1970s, and then, after bottoming out in 1981, began to depreciate steadily during the remainder of the 1980s. Comparing this real commodity exchange rate to the aggregate real exchange rate, note that during the period 1972-77 the aggregate real exchange rate was quite stable, while the commodity real exchange rate appreciated by almost 50 per cent. Since 1981, there has

Table 2-3
Composition of GDP, 1970-89

	Traded goods	Services	Resources
1970	0.430	0.582	0.150
1971	0.432	0.579	0.149
1972	0.430	0.580	0.144
1973	0.439	0.571	0.156
1974	0.428	0.581	0.137
1975	0.409	0.597	0.122
1976	0.417	0.589	0.119
1977	0.418	0.588	0.114
1978	0.411	0.593	0.106
1979	0.408	0.595	0.107
1980	0.396	0.604	0.105
1981	0.397	0.604	0.097
1982	0.386	0.614	0.100
1983	0.389	0.611	0.101
1984	0.393	0.607	0.102
1985	0.394	0.606	0.099
1986	0.388	0.612	0.098
1987	0.389	0.611	0.095
1988	0.388	0.612	0.090
1989	0.387	0.613	0.089

Note: Real GDP computed by industry at factor cost in 1981 dollars.
Source: Cansim database.

Table 2-4

Composition of total exports, 1971-89

	Resource export share	Auto export share	Nonauto manufacturing export share
1971	0.373	0.233	0.394
1972	0.395	0.233	0.372
1973	0.421	0.211	0.368
1974	0.466	0.173	0.361
1975	0.451	0.191	0.359
1976	0.427	0.215	0.358
1977	0.420	0.232	0.348
1978	0.409	0.234	0.357
1979	0.431	0.181	0.388
1980	0.433	0.144	0.424
1981	0.424	0.162	0.413
1982	0.422	0.202	0.376
1983	0.412	0.237	0.350
1984	0.378	0.270	0.352
1985	0.363	0.285	0.352
1986	0.337	0.270	0.394
1987	0.362	0.240	0.398
1988	0.347	0.247	0.406
1989	0.332	0.243	0.425

NOTE Nonauto manufacturing defined as consumer goods, machinery and equipment, and industrial products.
SOURCE Cansim database.

been a substantial depreciation in the real commodity exchange rate – about 35 per cent – while the aggregate real exchange rate actually appreciated over the same period. These developments reflect the dramatic pressures that have been felt within the commodity-based sectors over this period relative to other traded goods sectors and nontraded sectors. It is certainly not the case that changes in the nominal exchange rate have completely offset relative price changes between regions – an argument often similar to the idea of stabilizing the terms of trade. Given the stability in the aggregate terms of trade and the instability in the real commodity exchange rate, it is apparent that the concept of an "aggregate terms of trade" for Canada is questionable at best.

Unit Labour Cost

The most common form of competitiveness analysis focuses on a particular form of relative unit labour costs (real exchange-rate basis) measured in a common currency in particular industries or industry aggregates. Most often the focus is on manufacturing industries. A recent prominent example is the ambitious research program undertaken by the Economic Council of Canada, which was partly an examination of unit labour costs and their determinants.[11] The Council's research went much further, however, looking at the determinants of total factor productivity, which is a more sophisticated analysis of relative productivity differences between countries. Relative unit labour costs, however, are still by far the most popular measure of competitiveness, and they are the focus of this paper.

Unit labour cost has three basic inputs: a measure of labour productivity, referred to here as a, which is equal to output divided by hours, or O/H; a measure of compensation in local currency per hour of labour input, denoted by W; and a current nominal exchange rate defined as E. There is also a long-run "equilibrium exchange rate," usually the PPP rate, which shall be denoted P. Let U denote Canadian unit labour costs measured in U.S. dollars and U^* U.S. unit labour costs in U.S. dollars. These are constructed as follows:

$$U = (W/E) \times (P\ O/H). \tag{2.7}$$

$$U^* = W^*\ O^*/H^*. \tag{2.8}$$

The purchasing power parity exchange rate P is used to convert the index of Canadian output, which is expressed in constant Canadian dollars, into an index of output expressed in constant U.S. dollars; this is essential in order that "output" be valid for international comparisons. Both U and U^* are expressed in U.S. dollars per unit of constant U.S. dollar output. A set of typical calculations are those of Hooper and Larin [1989], reproduced in Table 2-5,

Table 2-5

Canada-U.S. unit labour costs in manufacturing, 1970-88

	United States	Canada
1970	35.0	31.8
1975	46.3	47.9
1980	65.7	62.6
1981	70.8	65.7
1982	74.4	75.3
1983	73.1	75.5
1984	71.7	70.2
1985	71.2	67.3
1986	70.0	68.1
1987	69.0	72.2
1988	69.9	80.7

SOURCE Hooper and Larin [1989], Table 5.

showing U.S. and Canadian unit labour costs in manufacturing for a number of years.

The real exchange rate indicated in the last column of Table 2-2 is the ratio of U.S. unit labour costs to Canadian unit labour costs, both measured in U.S. dollars and one expressed as a percentage of the other. A real exchange rate of 100 would mean the two countries are equally cost-competitive relative to each other in terms of the aggregate manufacturing sector. What is most alarming is the 1985-89 deterioration in the competitiveness of the Canadian manufacturing sector relative to the United States. From 1985 to the end of 1989, the real exchange rate in manufacturing appreciated by about 23 per cent. The numbers for 1990 are expected to be somewhat worse. To put this in context, it must be realized that this particular form of real exchange rate has an implied long-run equilibrium value of 100. Thus Table 2-2 indicates that the exchange rate in manufacturing was undervalued by about 13 per cent in 1979 and is now overvalued by at least 16 per cent. Looking at it another way, if all the adjustments were forced on the nominal exchange rate, the Canadian dollar would have to be worth 74 cents U.S., based on the misalignment existing at the end of 1989, in order to restore the real exchange rate in manufacturing to its equilibrium value.

A common problem with this type of methodology is that PPP rates, which are in themselves a form of equilibrium exchange rate, are used to define another form of real exchange rate – relative unit labour costs. Given the dramatic decline of competitiveness of Canadian manufacturing, this particular measurement issue is probably not high on the list of potential problems. The fact of the matter is that the recent dramatic appreciation of the Canadian dollar is the most significant factor at work here. Nevertheless, it is worth mentioning the basic difficulty. The PPP base rate used by Hooper and Larin, for example, is 1.17 for a base year of 1980. This PPP is used to convert constant Canadian dollar output in each year into constant 1980 U.S. dollar output. The apparent large relative productivity decline in Canadian manufacturing might be a statistical artifact if there were an index number problem in measuring Canadian output relative to U.S. output. Suppose, for example, that there had been a significant compositional shift of Canadian output throughout the 1980s such that the growth in constant 1980 dollar output was understated, or that there was a compositional shift in U.S. output such that its real increase was overstated. On the U.S. side, the high U.S. dollar in the early 1980s exposed U.S. manufacturing to a cold bath with a predictable but lagged impact. The late 1980s left a set of much leaner U.S. industries, which could have had the effect of shifting output towards high-productivity sectors. At the same time, the low Canadian dollar in the early 1980s essentially sheltered Canadian manufacturing and possibly deferred the adjustment. Perhaps Canadian manufacturing is now playing catch-up to the United States as it experiences its own cold bath.

To put this in context, we report in Table 2-6 the manufacturing bilateral real exchange rate for the United States versus Japan. From 1980 through 1985, the real manufacturing bilateral exchange rate between the United States and Japan appreciated dramatically, posting an increase of about 20 per cent. It then subsequently depreciated even more dramatically by about 90 per cent. Hooper and Larin attribute 90 per cent of the movement in the U.S. real exchange rate over this period to movements in the nominal exchange rate.

At the same time, the focus on manufacturing alone is clearly inappropriate for determining the misalignment of the aggregate real exchange rate. As indicated in Table 2-2, the manufacturing sector has at times been "undervalued," while the resource sector has occasionally exhibited large swings in its competitiveness in the opposite direction. The performance of the manufacturing sector reflects in part the "Dutch Disease"; that is, an increase in resource prices tends to hurt manufacturing in a resource-exporting country. This is clearly evident from the last two columns of Table 2-2. What is somewhat disturbing about the recent loss of competitiveness in manufacturing is that it has not been accompanied by a large improvement in real commodity prices – "Dutch Disease" does not appear to be a problem in the second half of the 1980s.

Table 2-6

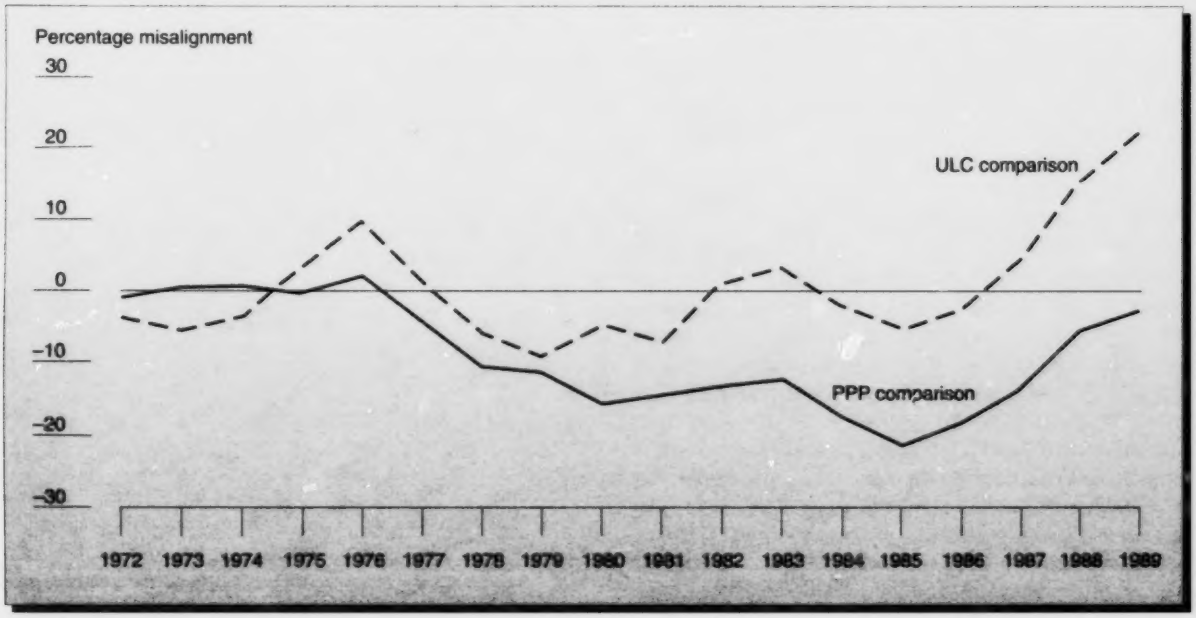
U.S.-Japan unit labour costs in manufacturing, 1970-88

	United States	Japan	Real U.S. exchange rate
1970	35.0	18.8	0.54
1975	46.3	42.8	0.92
1980	65.7	56.2	0.88
1981	70.8	59.7	0.84
1982	74.4	51.9	0.70
1983	73.1	53.0	0.72
1984	71.7	51.1	0.71
1985	71.2	49.4	0.69
1986	70.0	71.1	1.02
1987	69.0	81.8	1.18
1988	69.9	92.3	1.32

Source Hooper and Larin [1989], Table 5.

Figure 2-3

Misalignment of Canadian dollars relative to PPP and equilibrium unit labour cost, 1972-89



NOTE Positive number indicates overvalued exchange rate.

Multilateral Corrections to the Real Exchange Rate

An obvious question in attempting to determine the real equilibrium bilateral exchange rate between Canada and the United States is whether that rate has been affected by the dramatic swings in the U.S. real exchange rate vis-à-vis other countries. One reason for the observed substantial real appreciation of the Canada-U.S. bilateral rate may be the significant real depreciation of the U.S. dollar and the significant but less dramatic real depreciation of the Canadian dollar versus non-U.S. trading partners. To put the orders of magnitude in perspective, it must be kept in mind that trade between Canada and the United States represents about 80 per cent of Canada's total trade volume. An appropriate *multilateral real exchange rate*[12] for Canada, which takes account of non-U.S. trade, can be a geometric average of Canada-U.S. and Canada-Other real exchange rates; let us denote these by R_u and R_o. The aggregate real multilateral rate is defined by

$$\log R = 0.80 \log R_u + 0.20 \log R_o. \qquad (2.9)$$

Roughly speaking, according to unit labour cost (ULC) comparisons in manufacturing, Canada had a real bilateral exchange rate with the United States of about 135 in 1989. Relative to other countries, however, the Canadian real exchange rate has depreciated along with the U.S. dollar since 1985. In 1985, the Canada-Japan real exchange rate based on unit labour cost (ULC) comparisons (all converted to U.S. dollars) was about 73. It subsequently depreciated over the period ending in 1989 to about 114 – a 56-per-cent real depreciation. Using the yen as a proxy for all other non-U.S. trade and multiplying the yen appreciation by 0.20 indicates that the aggregate multilateral exchange rate should have depreciated by about 11 per cent, holding the Canada-U.S. bilateral rate constant. Over the same period, the Canada-U.S. relative ULC, measured in U.S. dollars, went from 90 to 135 – a 50-per-cent real appreciation. The sum of the two effects means the aggregate real multilateral rate therefore changed by

$$\begin{aligned} \delta R &= 0.8\delta R_u + 0.2\delta R_o \qquad [13] \\ &= 0.8\,(-50) + 0.2\,(+56) \\ &= -29. \end{aligned}$$

In aggregate terms, therefore, the multilateral real exchange rate calculated using ULC analysis appreciated by about 29 per cent over the period.

	Nominal Exchange Rates (C$/unit)	
	U.S.	Japan
1985	1.366	5.77
1989	1.184	8.60

Let M denote the multilateral nominal exchange rate calculated using the same weights as the real exchange rate Then, over the same period, using U.S.-Canada and Japan-Canada nominal bilateral rates, we obtain

$$\delta M = 0.8(-0.13) + 0.2(+0.51)$$
$$= -0.002.$$

The actual multilateral nominal exchange rate appreciated by less than 1 per cent. The difference between the real and the nominal rates based on ULC comparisons indicates that over the 1985-89 period the real multilateral rate depreciated by about 30 per cent. The actual nominal multilateral rate, however, remained virtually unchanged.[14] This raises the question of what combination of nominal exchange rate changes would prompt the multilateral real exchange rate return to its 1985 value. Holding the Canada-Other bilateral rate constant, it would take an additional 35 per cent depreciation of the Canada-U.S. rate from its 1989 level to restore the multilateral ULC competitiveness index to its 1985 value. On the other hand, is it possible, for example, that further U.S. dollar depreciation against the yen, holding the Canada-U.S. bilateral rate constant, could undo the appreciation of the Canadian against the U.S. currency over the same period? Suppose the deutsche mark and the yen were to appreciate 30 per cent against the U.S. dollar relative to their 1989 values. Holding the Canada-U.S. rate constant and assuming constant wages and productivity, this would lead to a 6-per-cent real multilateral depreciation of the Canadian currency. If the Canadian dollar were to depreciate by 10 per cent against the U.S. dollar, this would correspond to a total 40 per cent depreciation against the deutsche mark and yen. The total multilateral depreciation would then be 0.8 (–10) + 0.20 (–40) = (–8) + (–8) = –16, or 16 per cent. This would not suffice to restore the Canadian dollar to its 1985 multilateral real value.

It is now argued on a number of grounds that U.S. bilateral rates between Japan and Europe are not badly misaligned. On PPP grounds, many argue that the U.S. dollar will appreciate against these currencies over the longer term. In general, further large-scale U.S. dollar depreciation does not appear to be likely,[15] and this would in any case probably be insufficient to restore the multilateral Canadian real rate to its 1985 value. This suggests, on balance, that the equilibrium bilateral real exchange rate for Canada-U.S. manufacturing computed using ULC comparisons is probably biased towards error on the side of overvaluation. That is, if the U.S. dollar does appreciate against the other major currencies, even greater Canada-U.S. depreciation will be necessary to restore competitiveness to Canadian manufacturing.

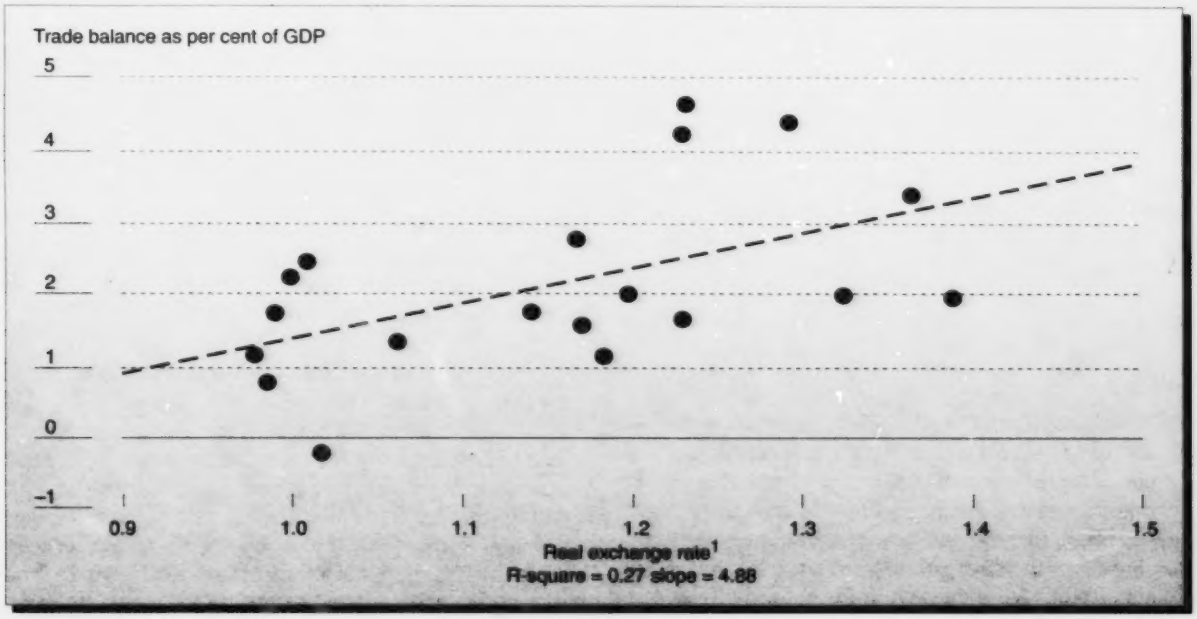
Partial Equilibrium – Balance-of-Payments Approach to the Equilibrium Value of the Canadian Dollar

In this section, a conventional external balance approach towards the "fundamental value" of the Canadian dollar is taken. This is quite distinct from the PPP or equilibrium real exchange rate line of argument. It uses trade price and income elasticities of international trade and observed capital flows to find a combination of exchange rate changes and income changes that will balance the current account. What is different about this approach to the equilibrium value of the dollar is that it explicitly relies on a structural model of trade flows and assumes that "equilibrium" is synonymous with equilibrium of the current account.

Two questions arise immediately: the appropriate definition of a balance-of-payments equilibrium, and the link between real exchange rates and external balance. Basically, this section will focus on the current account balance as the appropriate basis of external balance in attempting to determine the equilibrium exchange rate. The debate on this issue will be taken up at length in the next chapter. It is worth, however, raising a note of caution at this point about the presumed link between real exchange rates and external balance. Figures 2-4 and 2-5 show a scatter-plot of the real exchange rate versus the merchandise trade balance and current account balance, each expressed as a percentage of GDP. Also shown is the estimated simple linear regression line of the respective external balance against the real exchange rate. It is clear that, while there is a positive association between the real exchange rate and the external balance, the correlation is fairly low. This seems to be a feature of the data for a number of countries. Using more sophisticated statistical methods and a longer list of explanatory variables helps improve the explanatory value of equations attempting to explain external balance, but they do not change the picture much with regard to the role of the real exchange rate. One should, therefore, be wary of arguments that place the entire burden of external balance on the exchange rate alone or on presumed stability between exchange-rate changes and external balance.

Figure 2-4

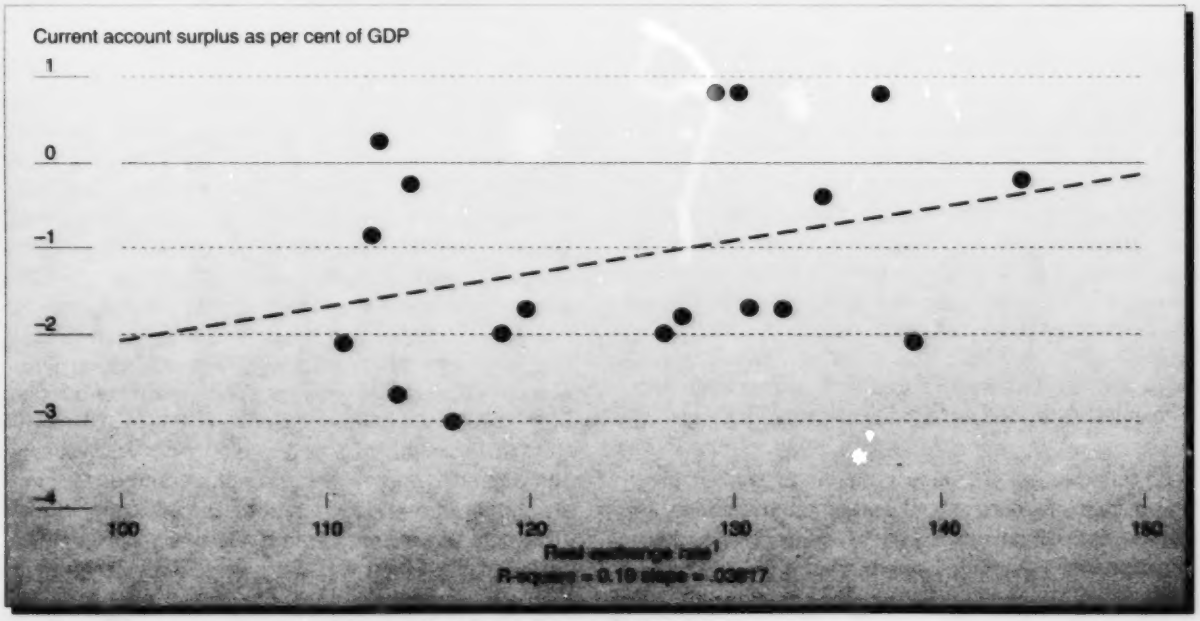
Trade balance and real exchange rate



1 Real exchange rate is the nominal rate divided by ratio of CPIs.

Figure 2-5

Current account and real exchange rate



1 Real exchange rate is the nominal rate divided by ratio of CPIs, Canada and the United States.

The model of the current account starts with the basic structural equations for exports and imports. Services and merchandise trade are aggregated. This assumes that the relevant income and price elasticities are the same for both categories.

$$\text{Export demand} \quad x = \alpha\left(p_x / p_x^*\right)^{-\varepsilon y \delta}. \tag{2.10}$$

$$\text{Import demand} \quad m = \beta\left(Ep_m^* / p_{cm}\right)^{-\gamma_y \delta^*}. \tag{2.11}$$

With $P_x = S_x / E$, and S_x the supply price of Canadian exports, y and y^* denote home and foreign real income; δ_m and δ_x denote import and export income elasticities of demand; ε denotes the price elasticities of exports, and γ denotes the absolute price elasticity of import demand. While ε can be thought of as incorporating export supply effects, on the import side the economy is viewed as a price taker with the foreign currency price of imports p_m^* exogenous.

Let X and M denote the home currency value of exports and imports. The trade balance is denoted as $T = X - M$. Let D denote investment income flows plus net transfers to foreigners. The current account balance CA is thus given by

$$CA = T - D. \tag{2.12}$$

An initial equilibrium is observed, consisting of trade flows, investment income flows, and initial prices and incomes. All prices other than E are held fixed and incomes are allowed to change. A combination of income and exchange rate changes is calculated to yield a current account balance holding D fixed. The model is calibrated to 1989 data, indicated as follows.

1989 Data for Canadian Economy

Current account balance	–16,688*
Exports	162,851
Imports	162,494
Import price elasticity	–1.02
Export price elasticity	–0.83
Import income elasticity	1.84
Export income elasticity	1.69

*Values expressed in millions of current dollars.

The elasticity estimates are from Marquez [1990] and reflect estimation over the 1972-85 period. An important observation on these elasticities is that Marquez finds Canada to be a "high-elasticity" country among the OECD countries. This implies that external adjustment can be accomplished fairly readily by changes in prices and incomes. The actual exchange rate over the 1989 year fluctuated in the 1.15-1.20 range. However, in order to correct for lags in the adjustment of the trade account to the appreciation of the Canadian dollar over the 1986-88 period, an average exchange rate of 1.23 is used in the calibration of the model, on the grounds that the trade flows over 1989 reflect markets' adjustment to this lagged and higher-than-observed exchange rate.

The results of the exercise are reported in Table 2-7. The calculations suggest that, at 86-85 cents U.S. the dollar is now grossly overvalued. However, the results also indicate that the equilibrium exchange rate is extremely sensitive to assumptions about income growth or stagnation. In particular, a deeper recession in the United States than in Canada would imply an exchange rate of below 70 cents U.S. Conversely, a relatively deeper recession in Canada would mean that the exchange rate would have to bear a much smaller share of the adjustment. Even in these circumstances, however, the dollar would have to fall into the 78-cent range, according to this model.

Table 2-7

Income and exchange-rate changes leading to current account balance

Home growth	0.03
ROW* growth	0.03
U.S./Canadian exchange rate	72.2
Home growth	0.00
ROW growth	0.00
U.S./Canadian exchange rate	72.6
Home growth	–0.02
ROW growth	+0.02
U.S./Canadian exchange rate	78.4
Home growth	–0.02
ROW growth	+0.02
U.S./Canadian exchange rate	67.6
Home growth	–0.02
ROW growth	–0.02
U.S./Canadian exchange rate	72.8

* Rest of world.

NOTE Growth measured in relative changes. Exchange rate measured in U.S. cents per Canadian dollar.

Even as a partial equilibrium model, there is much missing from the above aggregate picture of the trade balance. Of some importance is a potential change in the external terms of trade; in particular, an increase in the relative price of resource exports. Also of particular note for Canada are developments in certain sectors, such as forest products (which are dependent upon U.S. housing demand) and automobile assembly and parts, which account for a large fraction of Canadian manufacturing exports (see Table 2-4). In each case, there are structural reasons indicating that real exchange depreciation might not be sufficient to induce the assumed export response reflected in the elasticity estimates.

Conclusion

In this chapter a number of definitions of equilibrium exchange rates and the current evidence on the Canadian dollar to the end of 1989 have been reviewed. The different approaches offer a surprising variety of answers to the question of how much the Canadian dollar was misaligned over the last decade. A summary of the answers for the end of the decade are presented in Table 2-8.

Table 2-8
Misalignment of the Canadian dollar, 1989

	Predicted degree of misalignment
	(Per cent)
Purchasing power parity	–2.5
Equilibrium aggregate real exchange rate	
– corrected for productivity	+6 to +7
– corrected for commodity price and productivity	+7 to +9
Manufacturing unit labour cost comparisons	+29
Balance-of-payment equilibrium approach	
– balanced-growth recession	+15
– U.S.-led recession	+20
– Canadian-led recession	+8

NOTE + indicates overvalued, – indicates undervalued.

With the exception of simple PPP theory at the end of the decade, the analysis generally suggests that the Canadian dollar was overvalued by somewhere between 6 and 15 per cent. At the same time, it should be emphasized that the Canadian dollar was undervalued by similar if not greater magnitudes during the mid-1980s. Nevertheless, the surprising swing in the misalignment of the exchange rate over a relatively short period is cause for concern. The question is how seriously one should take the PPP estimates of an overvalued currency relative to its 1989 level. On balance, we tend to regard this result with some suspicion, because, as is now widely recognized, the PPP does not correct for underlying changes in the real economy, making such comparisons dubious. For reasons that will become clearer in the next chapter, the elasticities approach to current account balance as a theory to generate long-run equilibrium exchange rates is an approach that should be undertaken with considerable caution. The difficulty in this case is that the model is only appropriate for a situation of short-run unemployed resources, and the answers are quite sensitive to assumptions regarding relative growth rates. In our opinion, this approach is best used as an indication of what pressures the external balance is likely to put on the exchange rate in the short run.

The theory of equilibrium real exchange rates seems to be most appropriate for forming judgments about long-term misalignment, and it should not be ignored. One clear lesson is that the dramatic real depreciation of the Canadian dollar in the 1981-85 period led to a situation where the real exchange rate was fundamentally undervalued for some time. The current policy discussion on competitiveness and the exchange rate tends entirely to avoid the important role of non-traded in goods and services. It is a discussion that has tended to focus on the current overvaluation of the dollar rather than the equally dramatic undervaluation during the early 1980s. We must recognize that undervaluation of the exchange rate may be as serious a problem as overvaluation.

3 Explaining the Current Account

The concept of external balance is an area of international economics that has been characterized by considerable controversy over the years. In this chapter, we focus on one measure of external balance – the current account surplus – and the performance of the Canadian current account balance over the 1980s. The current account includes income flows between residents and non-residents that occur as a result of past capital account transactions. Thus it includes both income received as a result of assets held abroad by residents and income paid as a result of past debts incurred (rents on buildings or dividends on stocks, for example). To these income flows generated by asset and liability positions is added the trade surplus, and the sum of the two is referred to as the current account. It is probably the broadest measure of external balance, because it includes flows generated as a result of past borrowing and lending. The current account is of interest also because it is the mirror image of the capital account; the current account deficit must equal the capital account surplus.

This chapter reviews briefly the arithmetic of the current account, which takes into account the dynamics that occur as a result of economic growth and debt servicing. It then goes on to review the concept of a "sustainable external debt" and the implied performance of the current account. The potential misalignment role of the real exchange rate is reviewed in the context of sustainability. The chapter then reviews briefly the modern classical theory of the current account, which emphasizes the adjustment of savings and investment decisions of individuals and firms as the fundamental determinants of the current account, rather than as a direct measure of the trade performance of the economy. Because of the recent importance of this view in offering explanations of the U.S. trade deficit, it seems useful to review its significance in the context of the deterioration of the Canadian external balance in the latter half of the 1980s. Another section reviews the evidence on the aggregate components of the Canadian current account over the 1980s from the national savings/national investment perspective. The intention is to determine which component of savings or investment is most closely correlated with the deterioration of the external balance. The final section of the chapter deals with the appreciation of the dollar over the same period, and the question of whether the appreciation was consistent with the equilibrium view of the current account, or whether the exchange rate itself played an independent causal role in the determination of the external balance.

Current Account Arithmetic

Let B_t denote the trade deficit over period t, which we shall assume is one year. The basic dynamics describing the evolution of foreign debt is:

$$D_t = B_t + (1 + i)\, D_{t-1}, \tag{3.1}$$

where i is the nominal interest rate, and D_t is the stock of foreign debt at the end of period t. The complications introduced by dealing with real estate rental income and dividend payments on foreign-held equities is avoided by dealing with only one type of asset and liability – a bond paying a fixed rate of interest i. The current account deficit over period t equals $B_t + iD_{t-1}$.

The economy is assumed to grow at an exogenous rate g; letting Y_t denote real GDP, we obtain

$$Y_t = (1 + g)\, Y_{t-1}. \tag{3.2}$$

Let d_t denote the debt/GDP ratio and b_t the trade deficit/GDP ratio; and let r denote the real interest rate and g the growth rate of aggregate GDP. We shall ignore the complications posed by inflation and assume that all debt accumulated by foreigners is paid the domestic real interest rate. The debt-trade dynamics can be rewritten as:

$$d_t = b_t + [(1 + r)/(1 + g)]\, d_{t-1}. \tag{3.3}$$

A couple of features of equation (3.3) are worth noting. First, a steady-state foreign debt/GDP ratio is possible; that is, neither debt acceleration nor debt elimination if $r < g$, and a steady-state d^* possible if $r > g$. Let $\alpha = (1 + r)/(1 + g)$. Then d^*, and b^*, the steady-state trade deficit, must satisfy

$$d^* = b^*/(1 - \alpha). \tag{3.4}$$

Therefore, if $r < g$, and hence $0 < \alpha < 1$, a nation can run a persistent trade deficit and yet have a steady-state foreign debt/GDP ratio. If b^* is negative, or a country is running a

steady-state trade surplus, and $\alpha < 1$, then the net foreign-asset position of the nation will be positive; alternatively, if $r > g$ so that $\alpha > 1$, a steady-state net debt position is possible and consistent with running a steady-state trade surplus. To simplify matters, let us assume that the real interest rate exceeds the growth rate; in this situation a steady-state debt/GDP ratio is consistent only with a steady-state trade surplus. A *current account balance* implies that

$$(1 + g)\, b_t = -r d_{t-1}. \tag{3.5}$$

It is clear that current account balance implies a steady-state debt level, but not a steady-state debt/GDP ratio. Thus a country with a current account balance which is growing will generally have a shrinking debt/GDP ratio. What constitutes an appropriate definition of external balance is not at all clear for growing economies. Many would argue that the current account balance is far too rigid a concept, even in the longer run. We shall first consider the implications of looking at a constant foreign debt/GDP ratio as one concept of external balance. This raises the question of what constitutes an appropriate debt level.

Sustainable External Debt and Exchange Rates

Consider the following hypothetical question. Starting in 1990, how long could Canada run a balanced trade account, $b_t = 0$, without "unacceptable" increases in the debt/GDP ratio? After N years, the resulting ratio would be given by

$$d(N) = \alpha^N d_{1989}. \tag{3.6}$$

It is clear that the crucial factor here is the relationship between the real interest rate and the real growth rate of GDP, $r - g$. If $r = g$, then running a trade balance would have no effect on the d ratio. On the other hand, for r greater than g, the debt/real income ratio would grow. Suppose we take the initial debt/GDP ratio d_0 as the acceptable target ratio. Then after N years of running trade balances, the trade surplus (–the deficit) necessary to stabilize the debt/income ratio would have to equal

$$\begin{aligned} b^* &= -[(r - g) / (1 + g)]d(N) \\ &= \frac{-(r - g)(1 + r)^N}{(1 + g)^N + 1} d_0. \end{aligned} \tag{3.7}$$

Clearly b^* is a sharply increasing function of $r - g$. On the other hand, should it be desirable to return the d ratio back to the original level, $-b_t$ would have to exceed $-b^*$ for some time, and the adjustment on the trade account would have to be much larger. What are the orders of magnitude here?

The crucial question involves the "real debt" growth factor $r - g$. In Table 3-1, the implied stabilizing trade surplus required in 1995 as a result of sustained external imbalances over the 1989-95 period are indicated for different values of $r - g$. The initial foreign debt/GDP ratio is 0.35, and the assumed external imbalance is a constant observed trade surplus as a percentage of GDP over the period.

The extreme sensitivity of these numbers indicate the overwhelming importance of assumptions regarding real interest rates and growth. There is some justification for the frequently expressed worries about using tight monetary policy to cure external balance problems. Keynesians would argue that tight money raises the real interest rate and simultaneously reduces growth, leading to very unfavourable implications for debt accumulation. If a high $r - g$ factor is called for under one objective of policy, say inflation-fighting, then the necessity of restoring a trade surplus as soon as possible is more apparent in order to avoid a severe debt overhang problem.[1]

In most theories on the balance of payments, the real exchange rate plays a crucial role. Suppose the trade balance (as a percentage of GDP) is presumed to adjust slowly according to an equation

$$b_t = \beta(e_t - \bar{e}), \tag{3.8}$$

where e_t denotes the logarithm of the real exchange rate, and $\bar{e}$ denotes the long-run equilibrium real exchange rate; i.e., the real exchange rate at which the trade account is balanced.[2]

How long would it take to return to equilibrium following a period of an "overvalued" exchange rate? Consider

Table 3-1

Growth in foreign debt/GDP ratios with sustained external trade imbalance, 1989-90

	1995 debt/GDP ratio	Stabilizing trade balance (as % of GDP)
0.01	0.368	0.37
0.02	0.386	0.79
0.03	0.418	1.25
0.04	0.443	1.77

Source Calculations by the author.

the case of a temporary versus a permanent misaligned exchange rate. In Table 3-2 the following scenarios are considered. In Scenario 1, the Canada-U.S. exchange rate is held constant at 1.17 for the years 1989-91. The exchange rate is then assumed to return to its "equilibrium level" of 1.35, which generates an assumed trade surplus of 2 per cent of GDP, and this exchange rate then persists indefinitely. The resulting evolution of the debt ratio is indicated. By 1997 the debt ratio is back to where it started. This simulation indicates that even for a country like Canada, which has a large outstanding foreign debt, one should not be too alarmist about the state of the current account. In Scenario 2, the effect of holding the exchange rate permanently at 1.17 is indicated for the same parameter values on real interest rates and growth. In addition, the implied stabilizing trade surplus/GDP ratio is indicated for each year. In this case, the persistence of the trade balance is clearly cause for alarm, leading over an eight-year period to a 50-per-cent increase in the debt/GDP ratio. The implied trade surplus just necessary to stabilize the debt ratio rises from 1.4 per cent to 2 per cent of GDP. These numbers deteriorate dramatically for even small increases in the real interest rate/growth rate gap; this in turn reflects the fact that Canada starts out with a significant stock of foreign debt. The problem Canada faces in this regard is more serious than that in the United States, where the trade deficit could persist for many more years without reaching the levels of debt Canada has experienced in the past.

These figures also point out why the recessionary cure of external imbalances through reductions in economic growth explored in the static model in Chapter 2 are far from satisfactory. A reduction in the economic rate of growth with a large external stock of foreign debt but without a corresponding reduction in the real rate of interest implicitly raises the stock of debt relative to the size of the economy each year, and thus the ability to service that debt. This in turn is compounded each year. As a small country, Canada has limited ability to influence real interest rates.[3] One can imagine, therefore, the disastrous scenario that would result if growth were negative for a two-year period. Suppose, for example, that real interest rates were 5 per cent and growth was –2 per cent for a two-year period, 1990-91. If during that period Canada only succeeded in balancing the trade and service account, the debt/GDP ratio would rise from 0.35 to 0.40. If growth were to resume to, say, 2 per cent, the trade and service surplus necessary to stabilize the debt ratio at 40 per cent would be about 1.2 per cent of GDP. Keep in mind that with a service account deficit this would require a much larger merchandise trade surplus. A much larger surplus over a number of years would be required to return the economy to the original debt/GDP ratio.

Table 3-2

Foreign debt/GDP ratios and misaligned exchange rates, 1989-97

	Scenario 1: temporary misalignment	Scenario 2: permanent misalignment	
	$d(t)$	$d(t)$	$b^*(t)$
1989	0.350	0.350	0.0140
1990	0.365	0.365	0.0146
1991	0.382	0.382	0.0153
1992	0.377	0.398	0.0159
1993	0.372	0.416	0.0166
1994	0.367	0.434	0.0174
1995	0.361	0.453	0.0181
1996	0.356	0.472	0.0188
1997	0.350	0.492	0.0197

NOTE $r - g = 0.04$ in both scenarios.
SOURCE Calculations by the author.

In the previous discussion of external balance and misaligned exchange rates, the concept of an equilibrium exchange rate was motivated by external balance, defined as current account balance. Williamson [1985] and Krugman [1989] introduced a methodology that attempted to correct qualitatively the concept of misaligned exchange rates (or alternatively the notion of equilibrium exchange rates) to take into account the foreign debt accumulation implied by the evolution of trade deficits. An exchange-rate path is defined as *unsustainable* if it leads to an *accelerating debt/GDP ratio*. The focus is not on what the equilibrium exchange rate *is*, so much as what it is not.[4]

The argument, as developed by Krugman, goes even further; he introduces an estimate of the market's expectation of future exchange-rate changes and asks whether the market's forecast is consistent with sustainable growth in foreign debt. This is an important question because it admits the possibility that the market might be expecting an exchange depreciation that should correct the observed external deficit in the future. This in turn could influence judgments about the current extent of exchange-rate misalignment.

In the following exercise, we use the Krugman methodology to ask whether the Canadian dollar over the 1988-89 period was, in the sense defined above, over- or undervalued. A key input in this calculation is an estimate of the market's future expected exchange rate; this is done using uncovered interest rate parity (IRP) theory, according to which the difference between Canadian and U.S. interest

rates is the market's expected depreciation of the Canadian dollar. As is well known, Canadian rates have been well above U.S. rates for some time, suggesting a substantial expected depreciation. Since this did not happen in any of the years 1987-91 since the bottoming out of the Canadian dollar in 1986, this is perhaps yet another example of the well-known "Peso" problem – i.e., devaluations are uncertain events which occur only probabilistically[5] – or perhaps an indication that IRP theory is fundamentally flawed.[6] For the purposes of this study, it will be assumed that, since the Canadian exchange rate was expected to fall, the theory errs on the side of predicting too much depreciation relative to a risk-premium view of the Canada-U.S. interest differential. Therefore, taking the full interest differential as the market's expected exchange depreciation, we ask whether this exchange path is sustainable with a stable foreign debt/GDP ratio. If it is not, then certainly the implied growth rate in external debt would be even higher with less exchange depreciation.

Let e_t denote the logarithm of the *real exchange rate*. Then, by uncovered IRP theory, we have

$$e_{t+1} - e_t = r - r^*, \tag{3.9}$$

where r^* is the foreign real interest rate. By substitution, we get an equation that says that approximately[7]

$$(d_{t+1} - d_t) - (d_t - d_{t-1}) = \beta\,(r^* - r) + (r - g)(d_t - d_{t-1}). \tag{3.10}$$

The criterion for *sustainability* is that the debt/GDP path be non-explosive. That is, the right-hand side of equation (3.10) must be negative. If this were not the case, then the increase in the debt/GDP ratio would be increasing – i.e., accelerating. Thus we admit the possibility that d_t may be increasing, but not at an increasing rate. For this to be the case, it must be true that

$$\frac{r - r^*}{\bar{r} - \bar{g}} \geq \frac{(d_t - d_{t-1})}{\beta}. \tag{3.11}$$

Criterion (3.11) will be used as a check or a necessary condition for the sustainability of the current exchange rate, exchange rate expectations, and implied debt path. During 1989, the real growth rate in Canada was about 3 per cent. The real interest differential between Canada and the United States using one-year government bonds was on the order of 500 basis points (upper bound); thus the market expected about a 5-per-cent real depreciation of the exchange rate. The Canadian *ex post* real interest rate was about 8 per cent over that period. Consequently, the left-hand side of equation (3.11) is estimated at 1.0.

Some simple manipulation shows that the term $d_t - d_{t-1}$ is approximately the current account deficit divided by GDP. In 1989, the current account deficit at C$17 billion was about 3 per cent of GDP. The parameter β measures the effect of a 1-per-cent change in the real exchange rate on the trade deficit as a percentage of GDP, holding all other factors constant, including income growth in both countries. One can pick a wide range of numbers for this parameter, but the upper bound is probably in the order of 0.15. Thus the right-hand side of equation (3.11) equals a number in the order of 2.0, so that equation (3.11) is not satisfied. Consequently, the markets' expectations were not sustainable without an accelerating debt/GDP ratio.

The question then becomes: were expectations of an accelerating debt/GDP ratio reasonable? From 1980 to 1989, the reported foreign liability/GDP ratio was fairly stable, in the range of 32-37 per cent. This is true even though the current account (as a percentage of GDP) went from a surplus of 0.80 in 1984 to a deficit of 3 per cent in 1989. Preliminary figures indicate that there was little improvement in the external balance picture during 1990.[8] One cannot rule out the possibility that Canadians as a whole have chosen to raise the level of debt to GDP outside of the historical ranges. Increases in external borrowing could easily accompany a period of accelerating debt/GDP ratios, as is evidenced by the past couple of years. One could, for example, resort to life-cycle saving theories to suggest that this would be a plausible outcome of the savings behaviour of baby boomers, as they buy houses and durables during the early years of family formation. Certainly one must be careful in drawing conclusions from the very limited kind of analysis done by Krugman. Temporary accelerations in the debt/equity ratio would hardly be surprising in some circumstances, provided the market believed these increases would later be reversed.

Equilibrium Theories of the Current Account

In this section we change tack to examine the performance of the current account from the perspective of traditional savings and investment flows. This is now a fairly conventional approach in economics, working with the traditional national accounts identity, as follows:

$$G - T = S - I - NX, \tag{3.12}$$

where $G - T$ is the budget deficit, $S - I$ is the discrepancy between private savings and private investment, and NX is net exports. Much of the discussion of the U.S. trade deficit,

for example, has focused on the budget deficit as *the* source of the trade deficit problem. The "new classicists"[9] have emphasized a theoretical framework in which changes in savings and investment are equilibrium phenomena, and the associated foreign-debt accumulation or decumulation is rationally anticipated by forward-looking market participants. The basic idea here is fairly simple. Consumers' decisions about how much to save, which depend upon their opinions about future income, interest rates, tax treatment of saving, and so forth, determine aggregate private savings, S. Demographics will play an important role in the determination of national aggregates. An economy of relatively young or relatively old people would be expected to be aggregate net dissavers; since most saving occurs in the later middle-age years, economies with many aging baby boomers, such as Canada, should ultimately experience a rising savings rate as this group prepares for retirement.

Aggregate investment, on the other hand, is determined by the decisions of firms in accordance with their prospects and the profitability of new investment projects. Investment is taken to include resources devoted to new housing. The government sector's net dissaving is equal to the difference between government revenues (taxes) and government expenditures. Some versions of the new classical theorem[10] state that private savers can see through the veil of government financing to realize that current budget deficits imply higher future taxes. In the extreme case, any decreased saving by government reflected in a budget deficit is offset by increased private saving, as households anticipate saving now for future tax increases. We shall not dwell further on this highly controversial subject, but simply remark that it is not necessary to subscribe to extreme Ricardian equivalence even if the new classical approach to the current account is considered valid.

Since equation (3.12) holds as an identity, the validity of the new classical approach relative to more traditional approaches is difficult to prove. Obviously, Keynesians and New Classicists both see equation (3.12) as holding *ex post*. Hence, what is important: the factors determining imports and exports, M and X, or the ones determining I and S? The substance of the debate is the empirical question of whether the real exchange rate independently determines M and X, or whether M, X, and the real exchange rate adjust to accommodate movements in ex ante determinants of savings and investment behaviour. To date the evidence appears mixed.[11] However, the message of the new classical approach is certainly valid in part. Before one looks for casual links between the current account performance and real exchange rates, one must first eliminate a priori plausible explanations of movements in the current account based on the determinants of savings, investment, or government budget deficits.[12]

Performance of the Canadian Current Account, 1984-89

Recent deterioration in the Canadian current account balance raises questions as to what exogenous versus accommodating factors are at work. The alternative contending theories, all of which predict a worsening external deficit, are briefly reviewed. As to the recent experience of the current account, recall from Figure 1-1 that it has deteriorated from a surplus position in 1982-84 to a deficit of 3 per cent of GDP. A different external measure is total net exports, defined as the balance of merchandise trade plus nonmerchandise trade plus services. This measure is defined to capture noninvestment plus transfer transactions (i.e., those sensitive to the real exchange rate and corresponding to net export measure in the traditional textbook interpretation of external transactions). Total net exports fell from close to balance in 1982-84 to a substantial deficit in 1989. In Table 3-3, the components of net exports are listed. Notice that the importance of the nonmerchandise component of trade has been growing steadily over the last two decades. This feature, which is true of most industrialized economies, is associated with the growing importance of the service sector. As discussed in Cox and Harris [1991], a great deal of this trade is actually linked to trade in goods and, therefore, is in part a reflection of accounting conventions used in the collection of national statistics.

Table 3-3

Components of net exports, 1974-89

	Merchandise balance	Nonmerchandise balance	Service balance	Total net exports
		($ millions)		
1974	1,835	–3,134	–1,394	–2,693
1975	–345	–4,286	–2,063	–6,694
1976	1,559	–5,655	–2,568	–6,664
1977	2,972	–7,924	–3,041	–7,993
1978	4,312	–9,215	–3,212	–8,115
1979	4,424	–9,288	–2,627	–7,491
1980	8,778	–9,908	–3,131	–4,261
1981	7,292	–13,423	–3,414	–9,545
1982	17,654	–14,831	–3,601	–778
1983	17,457	–14,391	–3,846	–780
1984	19,838	–17,143	–4,434	–1,739
1985	16,392	–18,383	–4,861	–6,852
1986	9,944	–20,099	–5,194	–15,349
1987	11,107	–20,275	–6,219	–15,387
1988	10,114	–20,275	–5,682	–15,843
1989	7,557	–24,245	–7,229	–23,917

Source: *Canadian Economic Observer*, Historical Supplement, 1989-90.

A number of hypotheses have been proposed to explain why the current account deteriorated over the latter part of the 1980s. The following represents a list of alternative hypotheses. They are by no means mutually exclusive.

1 An exogenous increase in business investment due to an increase in future profitability. The latter may occur because of either: a) an anticipated improvement in Canadian terms of trade; or b) future productivity gains which may be achievable because of the phase-in of the 1988 Canada-U.S. Free-Trade Agreement (FTA).

2 A fall in household savings, due perhaps to demographic changes or anticipated tax reform. Also referred to as a consumption boom.

3 An increase in the budget deficit that is not offset by increased household saving.

4 An *overvalued real exchange* rate leading to a deterioration in net exports.[13]

It is impossible to decide which of these hypotheses are definitively true or false. Nor are they mutually exclusive. Since equation (3.12) holds as an **identity**, the various theories that focus on one side of the equation necessarily have a corresponding story on the other side of the equation. Nevertheless, different theories tend to place different emphasis on those factors that are initiating, relative to those that are accommodating. Second, policy changes versus external shocks receive different relative emphasis in these theories. We take each of these in turn. The aggregate expenditure components (the investment-savings decomposition of the current account) are listed in Table 3-4 and charted in Figure 3-1. The data are presented on an annual basis as a percentage of GDP. The question we now address is what can be said about the *ex post* movements of different components of savings and investment over the period. Such an exercise is not a "test" of any particular theory, but rather a check of the empirical facts that any theory must accommodate.

The Investment Boom Hypothesis

The Canadian current account started to deteriorate in 1984, at the close of the 1982-83 recession. The trend in gross investment rates in most OECD countries over the last two decades has been slightly downward. Over the 1971-80 period, gross investment in Canada was 24.7 per cent of GDP; over the 1981-87 period, gross investment declined to 21.6 per cent of GDP. According to the investment boom hypothesis, anticipated productivity gains from new investment led to increases in business nonresidential investment that in turn led to increased imports of capital goods and thus to a deterioration of the current account. As can be seen in Table 3-4, after rising to a peak of 15.8 per cent of GDP in 1981, business investment has steadily

Table 3-4

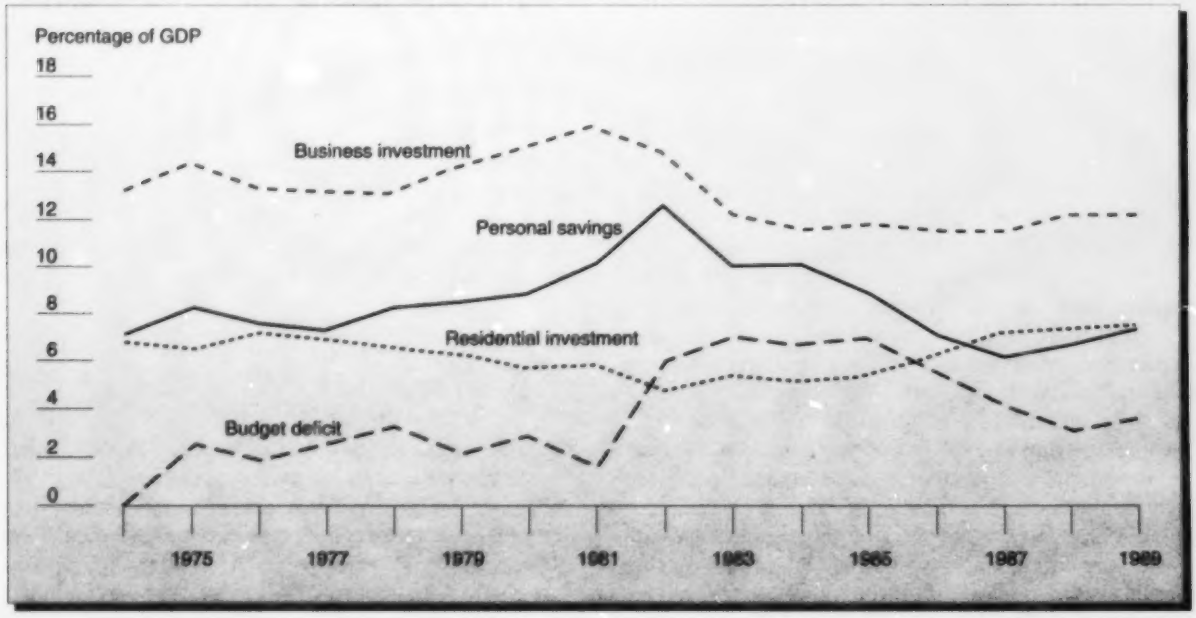
Decomposition of national income identity, as percentage of GDP, 1974-89

	Current account	Personal savings	Business investment	Residential investment	Budget surplus
1974	–0.84	7.10	13.17	6.77	0.02
1975	–2.70	8.26	14.34	6.43	–2.50
1976	–2.10	7.52	13.26	7.14	–1.80
1977	–2.00	7.27	13.08	6.83	–2.50
1978	–2.00	8.18	13.05	6.57	–3.20
1979	–1.80	8.40	14.11	6.15	–2.00
1980	–0.40	8.74	14.97	5.62	–2.80
1981	–1.70	10.02	15.83	5.78	–1.50
1982	0.80	12.50	14.78	4.70	–5.90
1983	0.80	9.93	12.16	5.25	–6.90
1984	0.80	9.99	11.42	5.02	–6.50
1985	–0.20	8.81	11.61	5.28	–6.80
1986	–2.10	7.02	11.40	6.09	–5.40
1987	–1.70	6.05	11.32	7.11	–4.00
1988	–1.70	6.51	12.06	7.22	–2.90
1989	–3.00	7.24	12.06	7.36	–3.40

Source *Canadian Economic Observer*, Historical Supplement, 1989-90.

Figure 3-1

Components of the current account balance, 1974-89



fallen. It bottomed out at about 11.3 per cent in 1987 and subsequently recovered to 12 per cent by late 1989. If the end of 1984 is considered to mark the end of the recession, the net swing in business investment has been an increase in about 0.6 per cent of GDP. Given the previous discussion on the commodity terms of trade, there is little reason to believe that an investment boom on the part of the resource sectors can explain the increase in investment since the end of the recession. The relationship between the FTA and investment is the same; losing industries will disinvest at the same time as those expecting to be winners invest. In terms of aggregate business investment, there is no reason to believe that the source of the external deficit was an increase in business investment. Given the depth of the 1982-84 recession, it is somewhat surprising that the recovery in business investment was not stronger.

Consumption Booms

For households there are two possibilities: a fall in savings or an increase in durables purchased. Personal savings as a percentage of GDP over the period 1974-89 is indicated in Figure 3-1, which shows an increase in savings from 7 per cent of GDP in 1977 to 12.5 per cent in 1982, and a subsequent decline to the 7-per-cent range.[14] The net swing from 1982 to 1989 was a decline of 5.25 per cent of GDP – very significant from any perspective. Obviously, the correlation between the current account deficit and the personal savings suggested by these data is an important factor in explaining the current account.

The personal savings rate does not include investment in housing, which is a potential source of domestic absorption and an important part of the story. Figure 3-1 shows residential investment as a percentage of GDP. It fell systematically from 1976 to 1982 and then rose from a low of 4.7 per cent of GDP to a 1989 high of 7.4 per cent – a swing of 2.7 per cent of GDP. This is clearly a piece of the household sector puzzle. Large expenditures on new and renovated housing accompanied the large-scale entry of baby boomers into the housing market. One can reasonably assume these decisions were "exogenous" in that they were in part dictated by life-cycle effects, but there remains the general question of what role the real interest rate played in these decisions or expectational effects.

On the whole, the consumption-boom hypothesis looks like a fairly plausible explanation of the principal component of the increased domestic absorption accompanying the external deficit. The magnitude of the consumption boom, defined as the net swing in personal consumption

plus residential investment as a percentage of GDP, was close to 8 per cent of GDP from 1984 to 1988.

Budget Deficits

The "twin deficits" theory, although often cited (perhaps because it is such an important piece of the U.S. trade deficit story) can be fairly easily dismissed. As indicated in Table 3-4 and Figure 3-1, the budget deficit as a percentage of GDP, after rising dramatically in the 1981-83 period, declined significantly until 1990. It remains in the order of 3-3.5 per cent of GDP and is a significant policy problem because of the public debt overhang that has been created. It may also be important, for example, because of the expectations of future deficits it creates in the financial markets.[15] But as far as "explaining" the current account deficit is concerned, the budget deficit does not do well, generally moving in the opposite direction. From 1985 to early 1990, the current account worsened and the budget deficit improved as a percentage of GDP. With the onset of the 1990 recession, the budget deficit is expected to worsen, but the current account deficit will not necessarily worsen. In the last recession, for instance, increases in private-sector saving offset government dissaving. The fiscal policy "explanation" of the current account does not appear very plausible.

In looking at the stylized evidence on the components of domestic absorption, it appears that the main explanatory variable is household consumption, including investment in new housing. The question is whether this experience was a consequence of a macroeconomic policy, intended or otherwise, or is explained by other factors unrelated to macroeconomic policy. Clearly the presence of a structural fiscal deficit during this period meant that some private-sector demand was crowded out relative to what it would have been had the structural deficit been in balance. However, looking at the *change* in the current account position over the 1984-89 period, it is evident that net exports were falling at the same time as government saving was increasing. Other macroeconomic policy explanations for the current account have been offered. One is the suggestion that monetary policy was unusually expansive, resulting in low real interest rates and stimulating the consumption boom. Real interest rates were low in 1982 to 1983 in Canada, but they then recovered, rising to historically high levels in 1988-90. So even if monetary policy was stimulative, this was not reflected in real interest rates and apparently only affected the household sector, not the business sector (at least not to the same extent). A second possibility is expectations regarding tax policy; perhaps consumers were anticipating the introduction of the GST, thus lowering the relative price of consumption in the mid-1980s relative to the 1990s and inducing intertemporal substitution of consumption expenditures towards the 1985-89 period. While possible, this also does not seem too plausible.

On balance, the evidence suggests that household consumption behaviour was being driven by a set of factors other than Canadian macroeconomic policy – both fiscal and monetary. Consequently, the facts thus far appear consistent with a classical equilibrium approach to the current account, according to which the current account deterioration was largely "explained" by the change in household consumption behaviour over this period.

Is the Equilibrium View of the Dollar Plausible?

The above discussion brings us back to the issue of net exports and the real exchange rate. Recall from Table 2-2 that the real exchange rate, as measured by the relative price of traded goods to nontraded, appreciated by approximately 24 per cent over the 1985-89 period. Could this real appreciation of the Canadian dollar be explained by the consumption boom alone *within the equilibrium framework*, or is there some dollar appreciation not accounted for by this theory? If it is true that all the observed real exchange rate appreciation can be explained within the classical equilibrium framework as an endogenous price response of the economy to the change in the composition of both internal and external demand as a result of the change in the consumption behaviour of households, then essentially there is no policy debate about the exchange rate. The exchange rate is more or less doing its job of efficiently reallocating resources. If, on the other hand, the observed dollar appreciation is not consistent with an equilibrium response of the economy to the change in the composition of demand, then the equilibrium hypothesis is called into question.

In this section, it will be argued that at least part of the dollar appreciation and consequent crowding-out of net exports must be accounted for by exchange-rate effects, which would not have happened had markets been driven by real fundamentals alone. In other words, either monetary policy or an exchange-rate bubble drove the real exchange rate beyond where economic fundamentals should have taken it. The argument is based on the counterfactual exercise of asking what the exchange rate should have done in response to an *exogenous* consumption boom had markets been in equilibrium, given what we know about the economy.

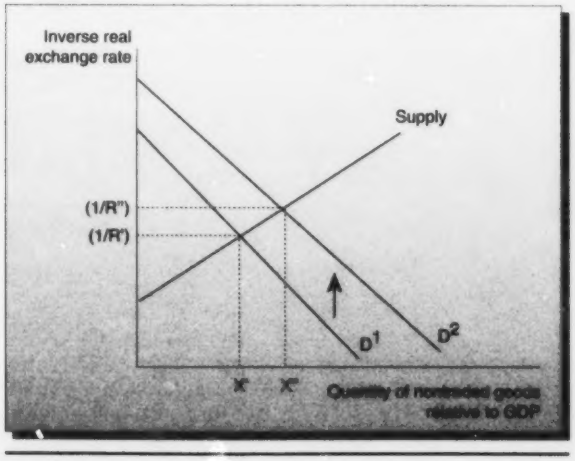
The counterfactual exercise begins with the assumption that the magnitude of the boom as a percentage of GDP is

independent of either real interest rates or exchange rates. Let us also assume the same is true of the budget deficit and business investment. The change in all components of national savings and national investment should have resulted in a net increase in domestic absorption equal to 2.3 per cent of GDP over the period 1985-89. It is also assumed that growth in the aggregate supply capacity of the economy is unaffected by the change in the composition or level of aggregate demand. If all magnitudes are expressed as a percentage of GDP, it is presumed that changes in the real exchange rate must reflect a change in the composition of domestic demand or its level relative to GDP. We assume the economy is a price taker in both export and import markets. The real exchange rate is thus measured as the price of tradables relative to nontradables.

The equilibrium counterfactual is summarized in Figure 3-2, illustrating the aggregate supply and demand for nontradables as a function of the real exchange rate. On the horizontal axis is the quantity of nontradables as a fraction of GDP, and on the vertical axis is the inverse of the real exchange rate, R; $1/R$ is the relative price of nontradables. The initial 1985 equilibrium corresponds to a demand curve D^1 and equilibrium price and quantities ($1/R'$) and X'. The demand curve is assumed to be generated by a preference function in which all Canadians (both households, business and government) spend a constant fraction of their income on nontradables.[16] The "consumption boom" explanation assumes that the shift in the demand curve represented by the observed aggregates at the end of 1989 corresponds to the new demand curve D^2, with a new equilibrium exchange rate ($1/R''$) and quantity of nontradables X''. Given an unchanging underlying supply structure, the supply curve (in proportional terms) does not shift. The equilibrium appreciation of the real exchange rate thus corresponds to a movement along the supply curve.[17]

Figure 3-2

The consumption boom and real exchange rate changes



The magnitude of the increase in the demand for nontradables would be proportional, given our assumptions regarding expenditure patterns, to the increase in aggregate domestic expenditure, or, in our context, proportional to the sum of the effects on the difference between national investment and national saving. The increase in the demand for nontradables is matched by an increased trade deficit. From the end of 1985 to the end of 1989, net exports as a percentage of GDP fell by approximately 2.5 per cent of GDP; from the national accounts identity (3.12) we can determine that national savings less national investment fell by the same amount. Alternatively, real spending on all goods by Canadians increased by 2.5 per cent of GDP. A constant fraction of this spending fell on nontradables. Letting A denote real spending, the demand curve for nontradables takes the form

$$Q = \gamma A / (1/R), \tag{3.13}$$

where γ is the fraction of spending that falls on nontradables. The shift in the demand curve corresponds to the increase in A equal to 2.5 per cent of GDP at all real exchange rates; hence the vertical shift in the demand curve is expressed as a percentage of GDP to D^2. Let $z = A/GDP$; i.e., spending as a fraction of GDP. Assuming the supply curve has a locally constant price elasticity ε and equating the increase in demand to the increase in supply, we find that the implied real exchange appreciation $R\hat{}$[18] and relative spending change $z\hat{}$ must satisfy[19]

$$z\hat{} = -[1 + \varepsilon]\, R\hat{}. \tag{3.14}$$

An increase in real spending relative to GDP (positive $z\hat{}$) implies a real exchange rate appreciation (negative $R\hat{}$). In 1985 the net export deficit was 1.4 per cent of GDP; at the end of 1985 the net export deficit was 3.7 per cent of GDP. Consequently, z in 1985 was equal to 1.014 and $z\hat{} = 0.023/1.014 = 0.0227$, or about 2.3 per cent.

Since the observed $R\hat{} = -0.24$, therefore $z\hat{}/R\hat{} = -0.096$. This implies a supply elasticity $\varepsilon = -(-0.096 + 1) = -0.904$, or a negative supply elasticity. This, of course, is inconsistent with an upward sloping supply curve. Consider two extreme cases. Suppose, for example, that the supply elasticity is zero. Then the 2.3-per-cent increase in real spending in the face of completely inelastic supply of nontradables would imply a real appreciation of the exchange rate of 2.3 per cent. If the supply elasticity is higher, the real

exchange-rate appreciation must be even less. Clearly this model is not capable of predicting anything close to the observed real exchange-rate appreciation. Even if the assumptions regarding spending patterns are modified so that all of the increase in real spending falls on nontradables, the exchange-rate appreciation is still much less than actually observed.

On balance, therefore, the observed change in the real exchange rate during the 1985-89 period appears inconsistent with an equilibrium model in which a consumption boom, partially offset by a decrease in the government budget deficit, drives the external deficit. Rather, it appears that the real exchange rate appreciated considerably beyond what fundamentals might have predicted. This suggests that the external deficit may be due in part to an overvalued exchange rate. Given the considerable lags with which real exchange rates appear to affect trade balances, the situation as of the end of 1989 is clearly not the end of the story. It is possible that further deterioration in the external balance will occur as a result of the lags in exports and imports to exchange-rate changes.[20]

Conclusion

In this chapter, we have reviewed the theory and evidence on the performance of the current account. Focusing on the current account requires a dynamic view of the economy in which the accumulation of foreign debt over time in response to continued trade deficits plays a role. The concept of sustainable external imbalances was reviewed, and the consequences of sustained misalignment for the external debt position of the economy were discussed. It was shown that all such calculations are extremely sensitive to assumptions regarding the difference between real interest rates and real growth rates. The latter sections of the chapter returned to the issue of exchange-rate misalignment. Applying the Krugman methodology of estimating markets' implicit forecast of the growth of the external debt/GDP ratio, it was shown that markets' expectations of future exchange rates seemed to be inconsistent with a nonexplosive foreign debt/GDP ratio. This evidence, while weak, appears to add further weight to the view that the Canadian-U.S. exchange rate was misaligned over the 1985-89 period. The chapter then goes on to review the performance of the current account when that performance is assumed to reflect the gap between national savings and national investment, in accordance with the new classical approach. The Canadian evidence on the components of saving and investment was reviewed. The conclusion was that most of the deterioration in the current account was associated with a consumption boom on the part of private households. Neither business investment nor government deficits appear to be the principal explanatory factor in the current account deterioration. The last section of the chapter reviewed the behaviour of the real exchange rate in conjunction with the consumption boom hypothesis. A simple general equilibrium counterfactual exercise was carried out, which attempted to determine whether the observed real exchange appreciation was consistent with the observed real exchange appreciation.

It appears, therefore, that the real exchange rate appreciated for reasons other than the increase in aggregate private consumption. Other possible explanations for the observed exchange rate appreciation must necessarily rely on nonorthodox explanations of how foreign exchange rates are determined. Simple theories connecting tight money and the exchange rate are usually rejected because of the inconsistent nature of exchange-rate expectations. Establishing a link between nominal interest rates and exchange rates has proved to be difficult, if not impossible. As is well known, uncovered interest rate parity theory does not work satisfactorily in the case of Canada. If it did, tight monetary policy to slow domestic spending booms should have produced a rapid real appreciation followed by long bouts of real depreciation, as in the overshooting model. Instead, we have had substantial real appreciation over a long period with significant exchange-rate overvaluation. One possibility is that, once started, appreciation creates a bubble in the exchange markets that requires extensive evidence of deteriorating fundamentals before bursting. Dornbusch's [1990] survey of exchange-rate theory concludes that the central problem with exchange-rate theory is its complete inability to explain short-run asset pricing. The performance of the Canadian dollar during the 1980s appears to be another episode in foreign exchange market pricing that awaits a coherent theoretical explanation.

4 Short-Run Effects of Exchange-Rate Changes

Introduction

In this chapter we take up the subject of the short-run impact of exchange-rate changes on the economy. This includes changes in prices, both export and import prices, changes in the volume of trade, and changes in employment in the traded-goods industries. Traditional Keynesian models presume a close and direct link between these variables. More recently questions have been raised by a number of economists on the reliability of the link between exchange rates and other economic variables. The literature runs the gamut of opinions, from the position that exchange-rate changes have no effect on some variables, at least in the short run, to the position that they have permanent and harmful effects.

In the context of the competitiveness debate, the link between exchange rates and the short- to medium-term allocation of resources is of considerable importance. The introductory chapter argued that exchange-rate changes have tended to swamp other determinants of cost competitiveness. At the same time, it must be recognized that exchange rates affect economic variables other than relative costs in substantial ways. If resources tend to be unresponsive to real exchange-rate changes, for a variety of reasons, then even larger exchange-rate changes may be necessary to produce the correct resource allocation among industries and among countries in response to either external or policy-induced shocks. The basic allocative efficiency of the flexible exchange-rate system presumes that the exchange rate will perform its allocation role reasonably well. Most of the issues covered in this chapter are motivated by criticisms of how the exchange-rate channel has apparently functioned. The critics argue that it has functioned badly. This chapter reviews the evidence on this controversial subject as it pertains to Canada.

Exchange-Rate Pass-Through

In macroeconomic terms one of the fundamental roles of the exchange rate is to change the relative price of foreign and domestic goods. This relative price change must occur in order for exports to increase and imports to decrease. It is now widely recognized that there are often long and variable lags between the change in an exchange rate and the change in a country's export and import prices. In particular, an exchange-rate depreciation should make imported goods relatively more expensive, but if the importing firms choose not to change the domestic currency prices of their goods, then the exchange-rate change will not be "passed through" to an import price change. This type of pricing behaviour is referred to as "pricing to market," i.e., setting prices for local market conditions and making them insensitive to the costs of production. It is now well established that Japanese and German importing firms engaged in pricing to market in the United States in the period 1985-87, when there was a dramatic depreciation of the dollar. While the U.S. dollar depreciated by about 29 per cent over this period against the deutsche mark, German import prices in the United States rose by only 12 per cent. The conventional rationale is that firms price to market in order to preserve market share; the consequence is that the profit margins of firms pricing to market are reduced if they are producing in the country whose currency is appreciating. In the long run, if profits become sufficiently negative, the firm must eventually exit the market where it is sustaining losses or else raise its prices.

In the Canadian case, the experience of the 1980s is summarized in Figures 4-1 and 4-2. In the case of end products, it seems clear that import prices at the aggregate level reflect exchange-rate changes quite closely. Thus importing firms appear to be setting prices in U.S. dollars, and changes in the Canada-U.S. exchange rate are "passed through" to Canadian buyers. Even though the Canadian currency depreciated dramatically against non-U.S. currencies from 1985 to 1988, it appears that the prices of these imports are closely linked to the U.S. dollar price. Thus the evidence is consistent with a model in which the Japanese and German firms set a North American price in U.S. dollars and at least partially price to market, while any Canada-U.S. exchange-rate change is passed through to Canadian consumers. U.S. firms tend not to "price to market" in Canada, but rather to set their prices in U.S. dollar terms. There is evidence of some exceptions to this rule in particular sectors, which will be discussed below. Reliable data are particularly hard to get in the case of multinationals, since the prices involved are internal transfer prices.

A different picture emerges with respect to Canadian exports, as indicated in Figure 4-2. There we see that export prices in Canadian dollar terms are fairly insensitive to the

Figure 4-1

Pass-through import prices (end products) versus exchange rate, 1981-89

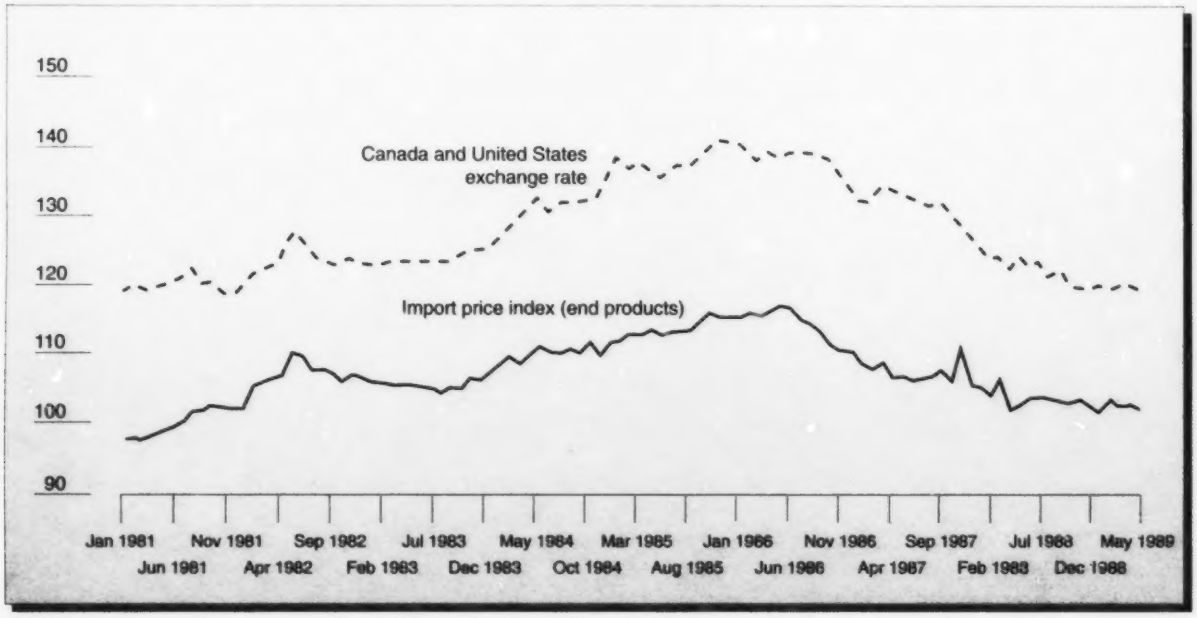
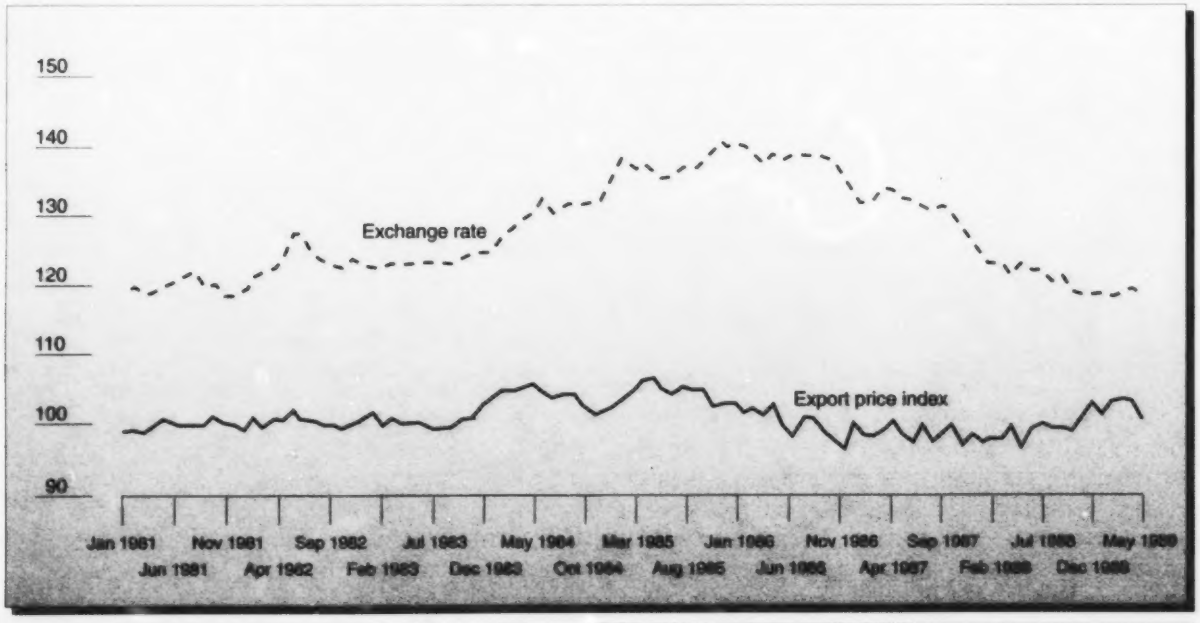


Figure 4-2

Pass-through export prices versus exchange rate, 1981-89



Canada-U.S. exchange rate. Canadian export firms therefore appear to base their prices on Canadian dollar costs. Thus a Canadian dollar appreciation is passed through by Canadian exporters, implying that the U.S. dollar price of these exports rises as the Canadian dollar appreciates. The situation is symmetric with respect to depreciations. Too much should not be concluded from this observation, however, because the situation appears to be sensitive to the choice of an export price index. It also contrasts with some other evidence on export pricing. Part of the problem may be the composition of aggregate exports. If primary products have prices set in world markets while manufactured exports exhibit pricing to market, then the trend in world commodity prices becomes important. As noted previously, there has been substantial real depreciation of export commodity prices. In the face of a constant exchange rate, this would have led to a decline in the Canadian dollar export price index. The relatively weak rise in aggregate export prices from 1981 through the period of Canadian dollar decline may reflect a combination of falling primary prices, with rising Canadian dollar prices of manufactured exports to the U.S. market. This is clearly a subject worth further investigation.

The foregoing discussion implies that pass-through is fairly high in the Canada-U.S. case, and consequently the exchange-rate change should induce the appropriate relative price changes anticipated by conventional theory. Consequently, the pass-through does not appear to be very serious for Canada, and one would expect exchange-rate changes to have an impact on the trade balance as predicted by basic economic theory. While there are no doubt exceptions to this aggregate view, on balance, it appears to be true.

There have been relatively few studies for Canada on exchange-rate pass-through. In the United States, for example, this topic received intense scrutiny following the post-1985 dollar devaluation. Under the law of one price (LOP), we have the following relationship between the domestic price p, the foreign price p^*, and the exchange rate E,

$$p = Ep^*. \tag{4.1}$$

In the most obvious context of applying the LOP, the prices refer to the price of the same product marketed by the same firm in the home and foreign country. If the LOP is true, then a change in the exchange rate E should lead to a 1-1 change in the ratio p/p^*. This is referred to as complete pass-through. More generally, one defines the pass-through elasticity as $\psi = (dp/dE)\,(E/p^*)$. If pass-through is complete, ψ will equal -1; for less-than-complete pass-through, it will be between zero and minus one.

Testing for pass-through has been a considerable problem because of the heavy reliance on aggregate data. One fairly old approach summarized in the survey of Goldstein and Kahn [1985] is to look at aggregate supply and demand elasticities for exports. Thus the level of exports is determined by the intersection of the demand for exports as a function of the foreign currency price with the domestic supply curve, expressed as a function of the home currency. As the supply curve is less than perfectly elastic, a currency devaluation that raises the domestic price of exports on impact will lead to excess supply, which depresses the domestic price of exports on impact. Thus pass-through on export prices is less than complete. It is also common to look at the dynamics of price response in such a framework. Goldstein and Kahn report some Canadian studies showing that export prices change in response to a 10-per-cent devaluation by 6.7 per cent after six months and by 9.5 per cent after two years, indicating almost complete pass-through. On the import side, Goldstein and Kahn indicate that responses to devaluations are usually quite short.

More recently, however, U.S. investigators have voiced considerable skepticism about the LOP. Dornbusch [1987], Krugman [1987], and Hooper and Mann [1989] have all provided U.S. evidence that challenges the LOP. Both Dornbusch and Mann [1990], for example, provide considerable evidence that U.S. import prices exhibit substantially less- than-complete pass-through. A fairly large literature using oligopoly theory has attempted to explain these data, using a variety of "pricing to market" ideas, as discussed previously.

In one of the more detailed studies, Marston [1990] directly examines Japanese manufacturing exports. He looks at the relative price p^*/p in both Japanese and U.S. markets for nine different sectors. Using the real U.S.-Japan bilateral exchange rate (thus correcting for inflation differences), he finds pass-through in Japanese manufacturing exports to the United States to be considerably less than consistent with the LOP. However, he finds a wide variety of pricing behaviour across markets.

The relevance of these studies to Canada is far from clear, for a couple of reasons. First, there is the overwhelming importance of the U.S. economy both as a market to Canadian exports and as a supplier of nonmarket goods. Second, a considerable portion of the manufacturing sector within Canada is dominated by U.S. multinationals. Consequently their pricing decisions are based on intrafirm strategic considerations rather than on what prices are needed to compete with the local competing suppliers. Important issues of transfer pricing arise because of the extensive intrafirm trade in parts, components and shared costs inputs, such as management services and research and development. In general,

there has not been enough research on the impact of exchange-rate changes on multinationals' pricing strategy.

In one recent Canadian study on export pricing, Schembri [1989] examines firm-level data for an anonymous export industry. His study is unique in that he has quite detailed data on firms' inputs and is therefore able to estimate costs in a much more sophisticated manner than most other studies. Schembri finds that Canadian exporters tended in the short run to absorb some exchange-rate changes in their price markups over marginal cost; Canadian dollar depreciation tended to raise the markup on U.S. prices. He finds that a 1-per-cent depreciation in the Canadian dollar tended to lower export prices by only 0.15 per cent in this particular case.

A recent study at both the aggregate level and for particular sectors is that of Wisner [1990]. Although primarily concerned with hysteresis (see below), he estimates some aggregate pass-through equations for exports that distinguish between changes in costs and changes in exchange rates. Unfortunately, because of very limited cost data, industry selling price indexes are used to proxy costs. Wisner finds that virtually all of the coefficients on exchange rates are insignificant, even though the pass-through equation is quite conventional. The lack of any significant relationship between export prices (in Canadian dollar terms) and the exchange rate sheds some doubt on the relevance of U.S. pass-through evidence and literature for Canada.

Given the overwhelming importance of the auto industry in Canadian manufacturing, it is important to have some idea of how changes in the exchange rate might affect pricing in that industry. Given that it is dominated by large U.S. multinationals, it is not too surprising that "pricing to market" might have a quite different meaning in this industry. Unfortunately, there are relatively few studies on this topic. One that sheds some light on the subject is Hazledine and Wigington [1987]. Their surprising conclusion about the pricing of automobiles sold in the Canadian market was that there was evidence of Canadian cost-based pricing, i.e., the price of all automobiles sold within Canada, whether produced in Canada or not, appeared to be influenced most directly by *Canadian costs*. They report two regressions, explaining the Canadian selling price as a function of Canadian and U.S. costs.

$$P_{can} = \underset{(1.5)}{2.18} + \underset{(3.3)}{0.714}\, Cost_{us} \qquad R^2 = 0.45$$

$$P_{can} = \underset{(4.1)}{1.44} + \underset{(16.7)}{0.844}\, Cost_{can} \qquad R^2 = 0.95$$

(*t*-statistics in brackets)

As can be seen, there is a remarkable difference in the fit and explanatory value of the two regressions. They report that adding the exchange rate to the latter equation added no explanatory power, and indeed the exchange-rate variable was insignificant. These results suggest that, as far as import prices are concerned, the Canada-U.S. exchange rate has at best an indirect effect, through its impact on costs in Canadian plants. Pass-through in this sector appears to be remarkably incomplete.

We could find little evidence other than anecdotal on export pricing for car models produced in Canada by the Big Three. What evidence there is suggests that the U.S. price is set largely independently of the Canadian exchange rate and indeed of Canadian costs, at least in the short run. In this particular sector, therefore, short-run pass-through can be presumed to be absent. Over the long term, however, the profitability of different plants would no doubt have some impact.

A study by Vaughn [1987] examines the pricing of Japanese auto importers to Canada using the same technology as Feenstra [1987] for the United States. The study finds that the total pass-through on Japanese car imports to Canada varies between 0.40 and 0.70. Comparing these results with Feenstra's, the author concludes that pass-through in the United States appears to be more rapid than in Canada. A comparison of the results of the Vaughn study with that of Hazledine and Wigington suggests that Japanese auto importers may price differently than U.S. firms in the Canadian market.

Some indirect evidence on pricing of Canadian exports is found in Alterman [1990], who reports that approximately 80 per cent of all U.S. imports are invoiced in U.S. dollars. If this is representative of the invoicing of Canadian exports to the U.S. market, it obviously facilitates pricing to market. This evidence contradicts the aggregate picture of Canadian export prices that was given in Figure 2-2.

The evidence on pass-through appears to be mixed. In general, no firm conclusions are possible. It does appear that the problems of pass-through are not too significant in the case of Canada-U.S. trade in the mid-1980s. Two caveats to these conclusions must be noted, however. First, the available studies do not consider the impact of the most recent Canadian dollar appreciation and, second, there are a number of particular features of the auto industry that suggest that the exchange rate is not the primary mechanism of adjustment.

Hysteresis in Trade

In this section we discuss "hysteresis in trade" – the proposition that exchange-rate changes can lead to permanent

changes in the structure of trade flows between countries. This proposition was advanced in a series of papers by Baldwin and Krugman in the mid-1980s and has received a considerable amount of attention.[1] The concept of "hysteresis" in trade stemmed from the following observation: the overvalued dollar led to deindustrialization of the U.S. economy and, in particular, a loss in comparative advantage in higher technology industries, but the subsequent dollar depreciation did not appear to be accompanied by a recovery of exports in those sectors.

A number of theoretical models have been proposed, all of which focus on two aspects of international trade: a) the high degree of uncertainty created by fluctuating exchange rates; and b) the sunk-cost nature of investment for the purpose of export. The most apt analogy for decisions regarding export investments is that of "option value." In the presence of substantial sunk costs to investment, a mistake can prove quite costly. For instance, if a Japanese firm were to set up a distribution system within the United States and the yen were then to appreciate substantially, the investment could lead to large losses. This possibility has two effects. First, it may introduce a reluctance on the part of the Japanese to invest in the first place and, second, it may make Japanese who do invest in the U.S. market reluctant to leave the U.S. market, given the nonrecoverable investment. The other aspect of hysteresis is connected with the concept of dynamic learning economies associated with the learning or experience curve. In these types of models, costs are endogenous and depend on volumes of cumulative output. A country with a lead in producing output ends up with lower costs and hence a comparative advantage in that industry relative to nonproducing countries. In such a world, a temporarily low exchange rate leading to larger sales volumes can have a permanent effect on relative costs and thus lead to hysteresis.

These types of arguments are of obvious relevance to Canada, particularly with the implementation of the FTA in 1988. Manufacturing firms must adjust not only to a high real exchange rate, but also to increased Canada-U.S. competition as a result of the FTA. The argument goes that Canadian manufacturing may actually suffer hysteresis for the same reasons laid out above – only in this case, without tariff protection, the exchange-rate shock has a much larger impact on Canadian firms.

It is too early to resolve this debate, because the evidence is simply not yet available to draw definitive conclusions. Within the United States, however, the outcome of the debate on hysteresis is far from clear, and indeed as of the end of 1990 the evidence in favour of the hypothesis appears weak.

The approach towards the hysteresis hypothesis has taken basically two forms. Beginning with Baldwin [1988*a*], one approach has been to look for a structural break in the pass-through equation. The idea is that "small" exchange-rate changes leave the structure of trade unchanged while "large" changes cause a structural break due to the entry and exit of firms. Generally, the evidence in favour of a structural break in the pass-through equation is weak to nonexistent. A recent survey by Mann [1990] concludes there is no evidence to support the hypothesis that a structural break occurred in the U.S. pass-through equation when the period of a high dollar is compared with the period of a low dollar. Froot and Klemperer [1989] attempt to explicitly account for the difference between exchange-rate shocks that were expected to be permanent and those that were expected to be transitory – the hypothesis being that only the former should affect pricing. However, they find no support for the hypothesis for pricing to market in the face of permanent exchange-rate shocks.

In other papers, particularly the work of Bean [1988], the approach has been to estimate trade-share equations and to look for evidence in these equations of apparent irreversibility of declines in trade shares due to exchange-rate changes. Bean estimates a dynamic adjustment-cost model for U.K. exports and finds some (fairly weak) evidence of hysteresis.

There has been little work thus far on testing Canadian data for hysteresis, despite its potential relevance. One such study is Wisner [1990], who attempted to test for structural breaks in the pass-through equation for Canada. However, because the estimated pass-through equations were insignificant he was unable to test for hysteresis.

The emphasis in the literature has been on those countries that "lose" as a result of hysteresis. Yet if the hypothesis is true, it must also be the case that some other country must "win" by having a positive exchange-rate shock. In the case of Canada, it was argued in Chapter 2 that the Canadian dollar was substantially undervalued relative to the United States during the early 1980s. It follows that Canadian manufacturing received a favourable exchange-rate shock, which ought to have raised Canada's export share of the U.S. market. To the extent true hysteresis is present, this share should have been persistent *ceteris paribus* in the face of the Canadian dollar appreciation from 1986 on. This does not appear to be the case. Indeed, a strong case against hysteresis in trade is provided by the Canadian experience during the 1980s. The substantial depreciation in the Canadian dollar from 1981 to 1986 was accompanied by substantial growth in manufacturing exports and in total exports. With a lag following the dollar appreciation from 1986 on, there

has been a continued deterioration in the trade performance of the Canadian economy. As will be reported in the next section, this appears to have had a significant impact on employment in the manufacturing industries. Consequently, the proposition that loss in export share is *permanent* does not appear plausible. The lags in the adjustment of exports and imports to exchange-rate changes has obviously been longer than expected. In the case of the United States, the strongest performing sector of the U.S. economy from 1988 to 1990 was the export sector. Many would argue that this is a predictable consequence of the dollar depreciation over the 1985-88 period.

Concern with hysteresis, therefore, has been replaced more recently by a debate on the length of the lag in the economy's response to permanent exchange-rate shocks. The long lags themselves raise considerable doubt about the relative effectiveness of the exchange-rate channel on economic performance. It appears that a period of exchange-rate misalignment in one direction must be followed by substantial overshooting in the opposite direction in order to achieve the appropriate economic adjustments. Even if hysteresis is merely a synonym for "long lags," it still leaves open the question as to whether the swings in exchange-rate misalignment are necessary for the appropriate allocation of resources over time.

Employment and Real Exchange-Rate Changes

In this section we turn to the basic question of short-run exchange-rate changes and their impact on employment in the Canadian manufacturing industry. The basic context of this question is a simple labour supply and demand framework, in which the tradable goods industries, either export- or import-oriented, are affected either positively or negatively by exchange-rate changes. The analysis does not deal with general equilibrium issues, nor is it intended to address issues such as dynamic adjustment of external balance. Its focus is more limited in order to gauge the employment sensitivity of industry to changes in the Canada-U.S. dollar exchange rate.[2] Implicitly, plant size, other capital stock variables, and other relative prices are held constant or assumed to be uncorrelated with exchange-rate changes. The basic data used are employment by industry, quarterly from 1973 to the end of 1989. The three principal explanatory variables in the regression equation are: an aggregate demand variable, defined as the sum of real GDP in Canada and in the United States; a supply-side variable, represented by the real oil price; and the real exchange rate, defined as the ratio of unit labour costs corrected for changes in the Canada-U.S. bilateral exchange rate. The equation estimated for each industry takes the following form:

$$\text{Log } E_t = \omega_t + \sum_{i=1}^{6} \alpha_i \log R_{t-i} + \sum_{i=1}^{4} \beta_i \log Y_t$$

$$+ \sum_{i=1}^{4} \gamma_i \log Poil_t + \varepsilon_t \qquad (4.2)$$

R denotes the real exchange rate, Y the aggregate demand variable, and $Poil$, the real price of oil. The estimation technique used was derived from Beach-MacKinnon [1978], with corrections for autocorrelation of the error term. The final regression form reflects the choice of lag coefficients that were significant. The final regression estimates are reported in Table 4-1.

The basic theoretical structure underlying equation (4.2) comes from a labour supply and demand model. Consider first the case of an import-competing industry.

The demand curve for the industry contains a term which reflects competing import prices EP^*/P. Markup pricing on unit costs are proxied by the real exchange rate R. A simple demand and supply model is defined by equations (4.3) and (4.4).

$$D = a + -b\,(W/p) + bR + cY \qquad (4.3)$$

$$S = e + f\,(W/P) + g\,Poil + K \qquad (4.4)$$

In equation (4.3) the wage is the real product wage, with p denoting the product price, and in the supply equation (4.4) the wage is the real wage. The real exchange rate enters (4.2) negatively, basic theory suggesting that a real exchange depreciation makes the foreign substitute product more expensive, thus pushing outwards the demand curve for the domestic product and hence the demand for labour. There are a variety of ways to close the model. One is to assume labour market equilibrium and to set $S = D$, assuming that the wage adjusts to clear the labour market. Substituting the market clearing wage back into (4.3) and substituting log E_t for labour demand (equal to supply) yields a reduced form such as (4.2). The K variable in (4.4) reflects shifts in supply due to changes in technology and capital stock and is considered to be adequately captured by the time-trend variable.

An alternative derivation of the reduced form (4.2) that is more consistent with the dynamic form of the equation is produced by explicitly introducing dynamics of adjustment. First, current product should reflect lags in consumer response to changes in relative prices depending upon the pass-through pricing response of importing firms to exchange-rate changes; thus the R variable should be replaced with a lagged series of real exchange rates. The other common assumption would be to drop instantaneous labour

Table 4-1

Employment estimations for 20 manufacturing industries

	Time trend	*LERATE*	*LENERG*	*LGDP*	*RHO*
Nondurable					
Food and beverage	–	0.139	0.037	0.506	0.404
		(2.1)	(1.0)	(3.5)	(3.4)
Tobacco products	–0.012	–0.034	0.436	–0.574	0.679
	(9.9)	(0.2)	(3.0)	(1.3)	(7.2)
Rubber products	–	–0.415	0.057	1.585	–
		(3.4)	(0.7)	(5.9)	
Leather products	–0.014	0.541	0.065	0.669	0.898
	(6.1)	(2.5)	(0.3)	(1.4)	(17.0)
Knitting mills	–0.002	0.029	–0.661	–	0.636
	(2.2)	(0.2)	(6.6)		(6.2)
Textile products	–	0.279	–0.641	0.319	0.769
		(2.1)	(8.3)	(1.3)	(8.7)
Clothing	–0.006	0.457	–0.113	0.506	0.618
	(5.3)	(2.9)	(0.8)	(1.3)	(5.9)
Paper and allied products	–0.007	–0.064	–0.002	0.691	0.437
	(1.2)	(0.9)	(0.3)	(4.2)	(3.6)
Printing and publishing	0.005	0.168	–0.200	–	–
	(28.0)	(2.4)	(4.0)		
Petroleum and coal products	–	0.335	0.615	0.029	0.915
		(2.1)	(4.0)	(0.1)	(20.0)
Chemicals and chemical products	0.019	–0.097	0.091	0.659	0.874
	(2.7)	(1.5)	(1.6)	(3.6)	(15.0)
Other	–0.008	0.253	–0.004	0.911	0.882
	(5.7)	(1.9)	(0.1)	(3.1)	(16.0)
Durable					
Wood products	–	0.009	–0.902	1.044	0.832
		(0.1)	(5.1)	(1.9)	(12.0)
Furniture and fixtures	–	0.570	–0.849	0.830	0.727
		(2.7)	(6.3)	(1.8)	(8.5)
Primary metal industries	–0.005	0.058	0.179	1.083	0.853
	(4.4)	(0.3)	(1.5)	(3.0)	(13.0)
Machinery	–	0.270	–0.237	1.218	0.665
		(1.0)	(2.1)	(3.0)	(6.9)
Transportation equipment	0.003	0.001	–0.192	2.050	0.339
	(5.3)	(0.1)	(2.7)	(9.3)	(2.7)
Electrical equipment	–	–0.199	–0.131	1.179	0.917
		(2.0)	(1.7)	(4.4)	(20.0)
Nonmetallic minerals	–	0.260	–0.579	0.855	0.377
		(13.0)	(10.0)	(4.5)	(3.1)
Fabricated metal industries	–0.006	0.368	–0.374	0.741	0.858
	(3.0)	(1.6)	(2.0)	(1.5)	(14.0)

NOTE *t*-statistics are in parentheses. Critical values are, at 5 per cent, $t = 2.0$, and at 10 per cent, $t = 1.67$ for a two-tail test. *LERATE* = log of real exchange rate on the basis of relative unit labour costs. An appreciation of the Canadian dollar is a decrease in the exchange rate. *LENERG* = log of the ratio of the CPI for energy and total CPI. *LGDP* = log of the detrended sum of U.S. and Canadian GDP in 1982 U.S. dollars. *RHO* = autocorrelation coefficient.

market clearing and assume a) labour supply always adjusts to equal labour demand with some lag, and b) wages adjust slowly to reflect notional excess demand for labour. This dynamic specification means that we can specify the wage dynamics independently and thus focus on the employment dynamics. This is our preferred interpretation and is consistent with the dynamic demand for labour theory. In any case, the real exchange and aggregate demand variables have the same predicted sign – an exchange appreciation should reduce the demand for labour with a lag depending upon how sensitive domestic demand is to changes in the foreign price. Note that to the extent pass-through in import

prices is weak or lagged, the real exchange-rate effect will be weakened.

In export industries the interpretation of the reduced form is slightly different. In this case, one channel of influence is an increase in domestic profitability on a unit of foreign sales, which causes firms to increase output in the face of a given product demand curve. Alternatively, to the extent that Canadian and competing goods are imperfect substitutes in the U.S. export market, the Canadian firm may choose to mark up prices on Canadian costs; in this case, a Canadian dollar depreciation would lower the U.S. dollar price, causing U.S. consumers to substitute toward the Canadian product and shifting outwards the demand for export curve. It is difficult to distinguish between these two mechanisms without actually estimating a pricing equation for exports. From the point of view of labour demand, however, the impact is more or less similar, as both result in an increase. However, the dynamics in this situation depend upon the dynamics of export pricing in response to exchange-rate changes versus the response to increased profitability on export sales. It is entirely possible that the profitability effect may only work with a considerable lag, particularly if entry barriers are high or capital-labour substitution is low. This is ultimately an empirical question.

The basic results support the idea that real exchange-rate changes affect employment in some industries. Parameter estimates are reported in Table 4-1. The theoretically predicted sign of the exchange-rate variable for tradables is positive – an exchange-rate depreciation raises employment.[3] The variable is positive in 13 of the 20 industries, and is significant in 7 of the 13 industries. The elasticity of employment with respect to the exchange rate in the 13 industries varies from 0 to 0.54; i.e., a 1-per-cent real depreciation causes employment to increase by less than 1 per cent. The oil price variable and the aggregate demand variable have, for the most part, the correct predicted sign. Disaggregating aggregate demand between Canada and the United States leads to problems of multicollinearity between the two variables and does not change the other results. Basically, the results support the hypothesis that the shifts in the demand curves in both Canada and the United States are highly positively correlated. In the case of petroleum and coal, the energy price variable enters with a significant positive sign; clearly in this case the energy price variable is proxying the shift in the demand curve for energy products and is not simply a supply variable.

The lack of apparent employment sensitivity in some of the sectors is interesting. In both transportation equipment and wood products, the real exchange-rate coefficient is both insignificant and close to zero – suggesting no real exchange-rate effect. In the case of transportation equipment, one possible explanation is the Auto Pact and the important role of the "Big Three" auto companies in total employment. Models which are produced within Canada are sold continent-wide, and their prices are more or less "set to market" in any given year. As discussed in the second section of this chapter, there is little role for Canadian exchange-rate effects on U.S. prices in the short run. Over the longer term, real exchange rates might affect investment, but under the Auto Pact's production-sharing arrangements this type of economic pressure is necessarily blocked. The results in the case of wood products are somewhat more difficult to rationalize. This is an industry whose output is largely destined for export to the United States and one would therefore expect that exchange-rate changes would have employment effects. One possible explanation is that prices are set largely in U.S. dollars in the U.S. market and therefore the demand pressures created by exchange-rate depreciation are largely due to the profitability impact of a lower Canadian dollar. Once cyclical shifts in the demand curve are accounted for, however, the profitability channel may be lacking in additional explanatory power. The results seem to indicate simply that employment in the industry is largely explained by the business cycle and supply shocks.

One industry with a *significant* incorrectly signed exchange-rate coefficient is rubber products; here, exchange-rate appreciations appear to increase employment. The explanation here may be that the exchange rate is affecting the industry largely through its impact on the prices of imported intermediate inputs.[4] By lowering the price of raw materials, a Canadian dollar appreciation lowers the cost of production and thus raises the demand for labour. It is also interesting that a large part of the output of this industry is tires, which are an input to the automobile industry. Because the aggregate demand for automobiles is governed by a production-sharing arrangement and is thus insensitive to Canada-U.S. exchange-rate changes, one would expect the demand for an input to this industry to be similarly insensitive to the exchange rate. In general, future research needs to account more carefully for the interindustry linkages and imported inputs when studying exchange-rate changes.

The Canadian dollar appreciation from 1986 to 1989 is a fairly good example of a situation where the exchange rate changed significantly over a fairly short period. The counterfactual question of how the exchange rate affected employment by industry is posed using the estimated equations for employment. The results are reported in Table 4-2. Specifically, the exchange rate is held at its average value for 1986 over the entire period 1987.I through 1989.IV. The predicted change in employment is reported in the right-hand column as a percentage of the actual employment prevailing at the

Table 4-2

Employment changes due to exchange-rate variations, 1989

	Actual employment	Estimated[1] employment	Percentage change
Nondurables			
Food and beverage	235,154	238,741	–1.55
Tobacco products	5,114	5,293	–3.50
Rubber products	81,918	73,345	10.45
Leather products	17,499	19,702	–12.60
Knitting mills	18,346	18,412	–0.35
Textile products	64,586	70,361	–8.95
Clothing	90,539	99,900	–10.35
Paper and allied products	127,457	124,910	2.00
Printing and publishing	144,350	146,044	–1.20
Petroleum and coal products	19,768	22,529	–13.95
Chemicals and chemical products	100,712	97,624	3.05
Other	78,277	80,254	–2.50
Durables			
Wood products	117,033	126,718	–8.30
Furniture and fixtures	64,876	70,545	–8.75
Primary metal industries	100,619	99,270	1.35
Machinery	105,111	101,179	3.75
Transportation equipment	219,911	216,767	1.45
Electrical equipment	128,517	121,128	5.75
Nonmetallic minerals	54,187	57,709	–6.50
Fabricated metal industries	161,796	169,594	–4.80

1 Results of dynamic simulations, holding the real exchange rate at its 1986 average value over the 1986-89 period. The other variables take their actual values.

end of 1989. A positive sign indicates that the actual employment was higher than would have been the case with a lower dollar. Not surprisingly, in many industries the appreciating dollar led to lower employment than would have been the case had the dollar not appreciated over that period. The employment losses are most pronounced in the nondurable manufacturing industries, while the employment gains are more evident in durable manufacturing. Wood products was the single largest job loser, with about 9,700 jobs lost as a result of the exchange-rate appreciation.[5] Another big loser was the fabricated metal industries, with about 8,000 jobs lost. The largest net gainer of jobs was rubber products, with an increase of approximately 8,400 jobs; electrical equipment was close behind with an increase of 7,400 jobs. The results indicate that the signs of employment changes in all industries are not related simply to exchange-rate changes. On the other hand, the magnitudes are far from inconsequential; it seems clear that changes in the real exchange rate cause industries to adjust their employment levels independently of other causes.

Turning to the aggregate level, the results summed across all manufacturing sectors indicate that 24,255 net jobs were lost as a result of the exchange-rate appreciation from 1986 to 1989. In total 30,022 jobs were generated and 54,277 jobs were eliminated by the exchange-rate changes over this period. The net job loss represents 1.253 per cent of all jobs in manufacturing. Thus, while the gross adjustments were fairly large, the net impact of the exchange-rate appreciation appears to be fairly small. One must be careful not to attach too much significance to these results. Summing across sectors avoids the problem of correctly accounting for interindustry linkages and linkages between manufacturing and other industries.

Conclusion

Historically, the short-run relationship between real exchange-rate changes and the impact on the economy has been summarized in crude form in such concepts as the J-curve; i.e., lagged response of the trade balance to exchange-rate changes. In recent years we have come to appreciate the relatively complex relationships that exist between the exchange rate and a host of economic variables, including prices, trade volumes, trade patterns, and employment. This chapter has summarized some of that literature and its relevance for Canada.

The basic message of this chapter is that the real exchange rate appears to have a considerable short-run to medium-run impact on the economy. Exchange-rate changes do affect relative prices, although the lags are uncertain and in some cases exchange-rate pass-through is less complete than assumed by traditional balance-of-payments theory. Nevertheless, relative price changes between foreign and domestically produced goods continue to play an important role in the balance-of-payments mechanism. The controversial hypothesis of exchange-rate hysteresis was also reviewed. The evidence appears quite weak in the case of the United States, and there is no evidence either for or against the hypothesis in Canada. The question will undoubtedly continue to play a role in the debate on the impact of the exchange rate on the Canadian economy.

Lastly, the evidence of the exchange-rate impact on employment was reviewed. Here the evidence supports the hypothesis that exchange-rate changes affect employment in the traded goods sector, although the quantitative magnitude of these effects varies across industries. In aggregate terms, employment in manufacturing is hurt by real exchange-rate appreciations in the short run.

On balance, it appears that the exchange rate has a significant short-term impact on both import prices and employment in the traded goods sector. Its effect on export prices is not so clear. One might conclude that the exchange-rate mechanism functions at least partly as it should, affecting relative goods prices and causing resources to move both in and out of the traded goods sector. Unfortunately, the evidence does not tell us whether the exchange rate is being correctly set so as to ensure efficient allocation of resources. Furthermore, it is conceivable that the observed movements in real exchange rates are excessive relative to what is necessary to accomplish the required resource reallocation. It is certainly the case in Canada that the exchange rate "matters" – in both the short and long run.

5 Summary and Policy Conclusions

Introduction

Competitiveness is determined by a host of factors, including productivity, the skill level of the labour force, the pace of technological adoption, work practices, and factor prices. It is also a fact that the exchange rate is a fundamental price that affects a country's ability to compete in international markets. The dimensions of the macroeconomic determinants of competitiveness as determined through the exchange rate are the focus of this study.

The "macroeconomic" aspects of the competitiveness issue can be very broadly defined to include fiscal, tax, and monetary policy. For the purposes of this project, these aspects are limited to the macroeconomic determinants of the external balance – both the trade balance and current account balance. A few words in defence of this emphasis are probably in order. First, this is the area where the current controversy is greatest. Most of the debate hinges upon the fundamental macroeconomic determinants of the external balance, and the particular role the exchange rate plays in determining the external balance. Obviously external balance is only one measure of international competitiveness, as the term is commonly used. From a welfare or long-term growth perspective, the external balance is not an appropriate end in itself. Countries with high growth rates often have long periods during which they run current account deficits. While not denying the importance of this type of consideration, in the interest of limiting the scope of the project, it was necessary to focus on the medium to short term.

The focus therefore is on the short to medium term and on how or if changes in exchange rates induce changes in the ability of a country to sell in foreign markets and to sell in its home market vis-à-vis foreign competing goods. Sorting out the determinants of trade balances is of considerable importance in attempting to achieve an appropriate perspective on longer run competitiveness issues because of the fundamental identification problem – distinguishing between changes in competitiveness due to long-term relative changes in productivity or factor abundance and changes due to macroeconomic factors, including external shocks (e.g., the oil price shock of the late 1970s). This confusion is abundantly evident in the debate on the U.S. trade deficit, for example, with one group citing the quality of U.S. management and labour as the fundamental source of the problem, and other groups claiming that the U.S. fiscal deficit is crowding out exports.

In Canada we have had a similar debate about the 1988 Canada-U.S. Free Trade Agreement. The recent deterioration in the Canadian manufacturing sector and the current account is cited by many as a consequence of the FTA, and the increase in imports and plant relocation to the United States is taken as evidence of fundamental microeconomic disequilibrium brought about as the consequence of the FTA. Many others have taken the position that these problems are due to the high Canadian dollar and/or high Canadian interest rates; in other words, they offer causal explanations based on perceptions about the working of macroeconomic policy within Canada and relative to our major trading partners. They also argue that the external deficit has little to do with the FTA.

This study looks at the exchange rate and external balance from a variety of angles, attempting to sort out the various arguments and hypotheses that have been put forward. In general terms, the conclusion is that the exchange rate "matters" a great deal and that movements in the exchange rate ought to be a concern for policy makers.

The Equilibrium Exchange Rate and Misalignment

In the mid-1970s there was a fairly broad consensus that floating exchange rates would work, in the sense that they could accommodate differences in national macroeconomic policies with the least disruption and that they would correct any external imbalances in a country's balance of payment automatically and smoothly.

The consensus view was upset in the early 1980s by the remarkable appreciation and subsequent depreciation of the U.S. dollar relative to the yen and the European currencies, coupled with large and persistent U.S. trade deficits. In addition, exchange rates seemed to be exceptionally volatile compared with what proponents of flexible exchange rates had suggested would be necessary to accommodate the policy differences across countries. The volatility in turn had disruptive effects on firms and workers in industries subject to international competition.

A large set of explanations were offered for these events, including some traditional explanations based upon the orthodox neo-Keynesian view, but by and large the orthodox view was called seriously into question. The issues raised included the source of the U.S. dollar appreciation, why in the face of massive trade deficits the dollar continued to appreciate, and why the subsequent depreciation of the dollar did not lead to a more marked improvement in the trade deficit.

Out of this experience two new views emerged on the external balance and the exchange rate. The first of these is referred to as the "inefficient exchange market" hypothesis. It asserts that the exchange rate can become decoupled from reality for significantly long periods of time, exhibiting both substantial volatility and speculative rises and falls far beyond that consistent with economic fundamentals. Irrational-destabilizing speculation is assumed to become the driving force in exchange markets for some periods. This hypothesis also assumes that the external balance is sensitive to changes in the real exchange rate. It leads to the question of what an equilibrium exchange rate really means or, alternatively, how badly "misaligned" exchange rates are at any moment in time. Much of the study is concerned with the basic question of what the equilibrium value of the Canadian dollar is and how such a question can ever be adequately answered.

The Canadian debate starts with the external balance reported in Figure 1-1; this is a graph of the current account as a percentage of GDP. After spending most of the 1970s in deficit, the external balance reached a surplus position in 1982-84, but has since returned to a significant deficit position, reaching about 3 per cent of GDP. Like the current account, it also deteriorated significantly over the 1984-89 period after improving for close to a decade. The link between exchange rates and current account balances for many countries is often weak; for Canada, however, it can be seen from Figure 1-2 that the real exchange rate (the price-level-adjusted Canadian price of a U.S. dollar) appears to follow the external deficit fairly closely. This link deserves greater study.

The longest standing theory of exchange-rate fundamentals is purchasing power parity (PPP). Although much maligned, it is still widely used in the financial community and by monetarists as a theory of the long-run exchange rate. On a bilateral basis one starts with price indexes for home and foreign national output denoted by P and P^*. These indexes in empirical work are usually GDP deflators, consumer price indexes, wholesale price indexes, or unit labour cost measures. The PPP equilibrium exchange rate is defined as $E = P/P^*$.

A representative PPP series of the Canada-U.S. bilateral rate is shown in Figure 1-2, which also plots the nominal exchange rate E, defined as the Canadian dollar price of one U.S. dollar. The PPP value or the dollar is normalized to US$1 in 1973. This was arbitrarily chosen, given that the external balance had been stable for most of the 1960s, as had been both the inflation rate and nominal exchange rate. The picture for the subsequent two decades does not change much as a result of choosing different base years prior to 1973.

The basic picture painted by these other PPP calculations using broad-based price indexes is that equilibrium value of the Canadian dollar is in the order of $1.10 to $1.15. This suggests that the current exchange rate is not far from its long-run value. On the other hand, the Canadian dollar was undervalued by purchasing power parity standards during the early part of this decade. Indeed the undervaluation was particularly dramatic in late 1985 and early 1986, when the dollar reached 1.42. At this point, the PPP value was around 1.10, indicating that the Canadian dollar was undervalued by about 25 to 30 per cent. Thus PPP theory suggests that the current perception of dramatic misalignment is mistaken and that the exchange appreciation of the last few years has only corrected for the undervalued exchange rate of the early and mid-1980s. A basic problem with PPP theory is the need to ensure that the bundles of goods being compared between two countries are in fact comparable. Some evidence was reported which suggested that the PPP value of the Canadian dollar is lower than the simple comparisons suggested above would indicate.

An alternative notion of exchange rate fundamentals is based upon the concept of the real exchange rate and thus the factors determining the real exchange rate. Unfortunately economists use the term "real exchange rate" rather loosely and it has come to be used both theoretically and empirically in a wide variety of ways.

A standard bilateral definition of the "real exchange rate" is the rate at which one unit of a country's GDP may be exchanged for a unit of another country's GDP. Conceptually, this involves selling one unit of GDP in one country, taking the proceeds, and purchasing a representative GDP bundle in the other country. The real exchange rate R is thus defined as $R = EP^*/P$.

It is argued that the real exchange rate is determined by "real" rather than monetary or financial factors. Thus it ought to be more stable than nominal exchange rates. Figure 1-2 shows the real Canada-U.S. exchange rate versus the nominal exchange rate. As can be seen, the two move remarkably closely together. Thus both volatility and trends

in nominal exchange rates have produced the same type of behaviour in real exchange rates. A theory of the real exchange rate is just as difficult to determine as a theory of the nominal exchange rate. However, using particular long-run theories of the allocation of resources across industries, it is possible to construct indexes of equilibrium real exchange rates; i.e., the value to which the real exchange rate should tend in the long run. In undertaking such calculations it is essential to correct for productivity growth differentials between different countries. Using a standard model of international trade, the calculations for Canada are interesting. They reveal at the aggregate level that the equilibrium real exchange rate is probably in the neighbourhood of 1.23 to 1.29. Thus while the current real exchange rate is overvalued, it is not as dramatically overvalued as might be suspected.

The theory of equilibrium real exchange rates is a powerful one, and it should not be overlooked. As in the case of PPP theory, one obvious lesson is that the dramatic real depreciation of the Canadian dollar in the 1981-85 period led to a situation in which the real exchange rate was fundamentally undervalued for a considerable period of time, so that the dollar did not become overvalued until fairly recently.

The most popular form of equilibrium real exchange rate calculation focuses only on those sectors that both export and import a large volume of goods; relative unit labour costs in particular industries are often used as the "real exchange rate." Comparisons of unit labour costs are quite striking, and they reveal a different picture than the other methods discussed. In the manufacturing sector the current exchange rate is overvalued by as much as 20 per cent, if the criterion used for the equilibrium exchange rate is the level necessary to equalize unit labour costs between Canada and the United States. On the other hand, this methodology suggests that the Canadian dollar in 1985-86 was only mildly overvalued at its low point.

A final method of determining the "fundamental" value of the exchange rate is to use a particular balance of payments model and try to determine what the exchange rate would have to be in order to restore external balance – in this case balance on the current account. A significant part of the research program was devoted to that question. It should be emphasized that changes in growth rates between countries can have a significant impact on the external balance of that country. Canada's external deficit, which in 1989 reached $16 billion, could be eliminated either by having Canadian growth shrink or turn negative thus reducing imports, or by having growth in the export markets accelerate, thus raising exports. On balance the research suggested that an exchange rate in the 72 cents (U.S.) range would restore balance in the current account assuming growth was symmetrical between Canada and the United States. Should growth in the United States slow to well below that of Canada (a major U.S. recession), then the Canadian dollar would have to sink as low as 65 cents (U.S.) in order to balance the current account.

The difficulty with equating the external balance to the current account balance is that Canada has rarely been in current account balance during the past two decades. A country with low real interest rates can run a balanced trade account and a growing foreign debt, while maintaining the foreign debt/GDP ratio constant, simply by growing fast enough. While Canada has recently had some growth in the foreign debt/GDP ratio, which now stands at about 35 per cent, this debt ratio could be stabilized with a much more modest improvement in the net export position than required by current account balance, provided that growth is maintained in the 3 to 4 per cent range and provided that real interest rates return to the 4 to 5 per cent range. In this case "external balance," defined as a stable foreign debt/GDP ratio, could be sustained with an exchange rate in the 78 to 80 cent range.

These calculations clearly suggest that the current value of the dollar (85 to 86 cents U.S.) is overvalued. However, the results also indicate that the actual number for the equilibrium exchange rate is extremely sensitive to assumptions about the definition of external balance, assumptions about income growth, and the methodology used to define the equilibrium exchange rate. On balance, however, the results suggest that the dollar is currently misaligned on the side of overvaluation by as much as 5 to 10 per cent.

Current Account Performance: Alternative Theories

The U.S. trade deficit led a number of economists to focus on the savings investment gap as the determinant of the external deficit and to de-emphasize the role of financial markets and monetary policy. These approaches start with the national accounts identity, which states:

$$G - T = S - I - X$$

where $G - T$ is the budget deficit equal to government expenditure minus tax revenues, $S - I$ is the discrepancy between private savings (S) and private investment (I), and X is net exports. For example, much of the discussion of the U.S. trade deficit has focused on the budget deficit as the source of the problem.

The "new" approaches to the current account focus on equilibrium changes in savings and investment and the associated foreign debt accumulation as the principal determinants of the current account. They do not rely on changes in the exchange rate as an exogenous factor explaining the change in the external balance of the economy. Recent deterioration in the Canadian current account raises the question of what exogenous factors might be at work according to these theories. That is how the current account can be explained by factors other than the exchange rate.

A brief review of the alternative (non-exchange rate based) theories that predict a worsening Canadian external deficit in the 1986-89 period is in order. Recall that the current account deteriorated from a surplus position in 1982-84 to a deficit of 3 per cent of GDP. Total net exports went from a balance in 1982-84 to a deficit of 3.5 per cent of GDP in 1989. Three basic hypotheses can be suggested to explain these developments.

Alternative Hypotheses Regarding Current Account Deficit, 1985-89

1 An exogenous increase in business investment occurred because of an increase in future profitability. The latter occurred because of either a) an anticipated improvement in Canadian terms of trade, or b) future productivity gains achievable because of the phase-in of the 1988 Canada-U.S. Free Trade Agreement (FTA).

2 A fall in household savings occurred, perhaps because of demographic changes or anticipated tax reform. In other words, a consumption boom occurred, including an increase in expenditures on housing.

3 An increase in the budget deficit occurred, perhaps because of demographic changes, or anticipated tax reform. In other words, a consumption boom occurred, including an increase in expenditures on housing.

The evidence on the components of domestic expenditure over the period appears to indicate that the principal explanatory variable accompanying the worsening external deficit is household consumption, including expenditures on new housing. The question, of course, is whether this experience is a consequence of macroeconomic policy, intended or otherwise, or whether it was an accommodating adjustment to the exchange rate appreciation over that period. Clearly the presence of a structural budget deficit during this period created a problem, but the root problem does not appear to be real government spending on goods and services. Similarly, it did not appear that in aggregate there was an investment boom, despite the signing of the Canada-U.S. Free Trade Agreement in 1988.

The research of this project suggests that at least part of the dollar appreciation and consequent crowding-out of net exports must be accounted for by exchange-rate effects that would not have occurred had markets been driven by real fundamentals alone. In other words, either monetary policy or an exchange rate bubble (destabilizing exchange market speculation) or other noneconomic factors drove the real exchange rate beyond where economic fundamentals should have taken it. Using conventional general equilibrium methods, the maximum equilibrium real exchange-rate appreciation accompanying a consumption boom on the observed order of magnitude should have been about 2 to 4 per cent. It appears, therefore, that for other reasons the real exchange rate appreciated beyond what fundamentals would have predicted using current account theories emphasizing exogenous changes in consumption, investment, and government deficits as the principal explanatory factors behind a trade deficit or surplus. Consequently one can only conclude that the exchange rate is affected by factors other than simply "real fundamentals," and furthermore that the external balance is sensitive to the level of the real exchange rate.

Short-Run Exchange-Rate Effects

Having looked at alternative views of long-run exchange rate fundamentals, it remains to establish the short-term impact of exchange-rate changes. The study reviewed evidence on this traditional question on a number of fronts in light of the developments in international economics over the last decade. The traditional pre-1980 view was that the exchange rate had significant effects on the external balance of an economy, and on output and employment in both export- and import-competing industries. This view was summarized in the concept of a "J-curve," which asserted that an exchange-rate depreciation would at first worsen the trade balance, but would with a lag eventually lead to an improvement in the trade balance as relative price effects came to bear on exports and imports. This view was challenged during the 1980s. First, there was the question as to whether exchange rates induced corresponding price changes in traded goods – this is now known as the exchange-rate "pass-through" issue. Second, there was the view that periods of exchange-rate misalignment might lead to permanent changes in the pattern of comparative advantage among countries producing manufactured exports. In particular, in response to the overvalued U.S. dollar in the early 1980s, many observers felt that the U.S. might never recover its world market shares in a number of key high-technology sectors. Exactly the same question comes up in

the case of Canada, and is given added importance because of the Free Trade Agreement and the additional competition that free trade with the United States is likely to bring. This hypothesis is now referred to as "trade hysteresis." Finally there is the basic empirical question as to the exact sensitivity of employment in tradables sectors to changes in exchange rates. As a basic policy matter, any assessment of adjustment costs in labour markets would hinge upon just how sensitive jobs are to exchange-rate changes.

Exchange-Rate Pass-Through

In macroeconomic terms one of the fundamental roles of the exchange rate is to change the relative price of foreign and domestic goods. This relative price change must occur in order for exports to increase and imports to decrease. It is now widely recognized that there are often long and variable lags between the change in an exchange rate and the change in a country's export and import prices. In particular, an exchange-rate depreciation should make imported goods relatively more expensive, but if the importing firms choose not to change the domestic currency prices of their goods, then the exchange-rate change will not be "passed through" to an import price change. This type of pricing behaviour is referred to as "pricing to market." It is now well established that Japanese and German importing firms engaged in pricing to market in the United States in the period 1985-87, when there was a dramatic depreciation of the dollar.

In the Canadian case, the experience of the 1980s suggests that manufacturers are setting prices in U.S. dollars, and changes in the Canada-U.S. exchange rate are "passed through" to Canadian buyers. Even though the Canadian currency depreciated dramatically against non-U.S. currencies from 1985 to 1988, it appears that the prices of these imports are closely linked to the U.S. dollar price. Thus the evidence is consistent with a model in which the Japanese and German firms set a North American price in U.S. dollars and at least partially price to market, while any Canada-U.S. exchange-rate change is passed through to Canadian consumers. A different picture emerges with respect to Canadian exports, as indicated in Figure 4.2. There we see that export prices in Canadian dollar terms are fairly insensitive to the Canada-U.S. exchange rate. Canadian export firms therefore appear to base their prices on Canadian dollar costs.

Thus pass-through appears to be fairly high in the Canada-U.S. case, and consequently the exchange-rate change should induce the appropriate relative price changes anticipated by conventional theory. Pass-through does not appear to be very serious for Canada, and one would expect exchange-rate changes to have an impact on the trade balance as predicted by basic economic theory.

Hysteresis in Trade

Do sustained periods of exchange-rate misalignment lead to permanent changes in the pattern of comparative advantage? This question has been widely posed in recent years, often expressed as a worry that exchange-rate overvaluation could lead to a permanent loss in high value-added industries. In Canada, the Canada-U.S. Free Trade Agreement (FTA) opened Canadian industry to U.S. competition at precisely the same time as the Canadian dollar appreciated against the U.S. dollar. Consequently, the adjustments that were necessary on the part of Canadian firms have been, at best, delayed and, if hysteresis is present, may never occur. The argument is that the capital and skilled labour on which comparative advantage is built will move in response to the combined effect of the high dollar and reduced protection under the FTA, and that a return of the dollar to a more "competitive" level will not restore the situation prevailing when the FTA was signed.

It is simply too early to realistically assess this theory by conventional scientific standards in economics. It may or may not be true. The decline in manufacturing employment and plant closures that have accompanied both the recession and the high dollar could be entirely explained by the recession. Furthermore, hysteresis would require that the Canadian share of the U.S. market would not return to its original value once the recession is ended and the exchange rate returns to a level consistent with fundamentals. While not denying the potential validity of the concerns raised by the hysteresis point of view, there are at least two reasons to be skeptical of the contention that the loss may be permanent.

The first piece of evidence comes from recent work on the U.S. trade deficit. In response to the U.S. dollar depreciation of 1985-88, it was found that there was substantial growth in net exports, albeit with a considerable lag. Indeed, during 1989-90 exports were the fastest growing sector in the United States. Furthermore, U.S. export shares in key sectors such as machinery and equipment, telecommunications and computers have returned to the levels prevailing prior to the dramatic appreciation of the U.S. dollar in the early 1980s.

The second piece of evidence relates to the performance of Canadian manufacturing during the period 1984-86. By all calculations, the Canadian dollar was undervalued by as much as 25 per cent vis-à-vis purchasing power parity

values during this period. Fairly significant growth in manufactured exports occurred during this period. Canadian market shares in a number of manufacturing industries grew more in 1982-83 than would have been predicted by assuming the recession of that period ended when it actually did. Following this period of high growth in manufactured exports, the dollar appreciated in 1986-89. Note that this happened even though the Canadian dollar depreciated against the yen and the European currencies. Consequently, the growth in market share attributed to the undervalued Canadian dollar was anything but permanent, and indeed it is surprising how rapidly it has eroded. There is every reason to believe, therefore, that exchange-rate devaluation would be capable of restoring the competitiveness of Canadian manufacturers, and that hysteresis is not present. Additional evidence supporting this conclusion is found in a survey of econometric estimates of Canadian trade elasticities. Canada appears to have some of the higher relative price elasticities of exports and imports among the OECD countries. This means that Canada's exports and imports tend to be price-sensitive, at least relative to many of our competitors. This sensitivity is symmetric, in that both price increases and price decreases affect Canada's ability to export and the exposure of Canadian firms to competing imports.

Having expressed this optimistic view, however, a word of caution is in order. In the absence of a protected home market, Canadian manufacturing is based to a considerable degree on the supply of skilled labour necessary to run a technologically advanced firm. Unlike the United States, Canada faces the real possibility of losing a large number of skilled individuals during a period of significant market downturn. Canadian scientists and engineers can readily find employment in the United States. U.S. engineers, on the other hand, will typically not migrate to Japan or Europe in response to lower wages or poorer employment opportunities. If this assumption is valid and the demography of the Canadian labour force is taken into account, there is a real possibility of hysteresis, or at least something close to it. Adjustment to a high exchange rate involves not only output and employment declines, but an exodus of human capital. If these people migrate to the U.S. and are in the 30 to 40 age bracket, a subsequent recovery in the cost competitiveness of Canadian manufacturing in the mid-1990s may not prompt the reverse migration needed to restore Canadian manufacturing to the 1988 level. If the people do not return, then investment in physical plant and equipment will decline and jobs in less skilled categories will fail to emerge. It is impossible to establish just how real this risk is, but the research suggests that there is a cause for alarm.

The problem for policymakers is simply that by the time hysteresis is confirmed or denied by the evidence, in many respects it will be too late for any action to be taken. Given the risk, perhaps it is only prudent some action be taken.

Industry Employment and Exchange-Rate Changes

Most people would feel that jobs are sensitive to the exchange rate, in the sense that a higher exchange rate would reduce employment in export industries and in import-competing industries. The actual mechanism by which this occurs involves a number of channels. Factors include the extent to which exchange-rate changes affect selling prices versus profit margins, the rate at which firms shed labour versus capital, and the rate at which firms in an industry exit in response to reduced profitability or enter in response to higher profitability. Part of the project consisted of a statistical examination of employment in 20 Canadian manufacturing industries over the period 1971-89. The model used in this part of the project was a basic supply and demand model of employment at the industry level. Thus it was not possible, for example, to identify changes in the number of plants or firms through entry and exit from the industry. Even at the industry level, however, it is possible to identify some systematic differences across industries regarding exposure to exchange-rate changes based on the export or import orientation of the industry.

The results were consistent with the hypothesis that the greater the exposure of an industry to international competition, the greater the impact of an exchange-rate change on industry employment. However, the lags of the response seemed to be highly variable across industries and across time. It was difficult to separate the impact of exchange-rate changes from that of resource price changes in a number of the resource-based industries. Furthermore, the significant external shocks in the sample period included both the oil shocks and the 1982-84 recession. Both of these shocks had a larger independent effect than any of the annual or biannual exchange-rate changes. Overall, it appears that resource-based industries seem to be quite sensitive to exchange-rate changes. The difficulty is that resource prices tended to move in the same direction as the Canadian dollar during the sample period, with the effects partially offsetting changes in output and employment.

In the case of manufacturing exports, a large part of the growth in total exports has been in assembled automobiles. Since the Big Three produce for the North American market as a whole and have done so for a considerable period, short-term exchange-rate fluctuations in the Canadian versus the U.S. dollar tend to have little impact on the output of the models produced within Canadian plants, and thus on

employment in these plants. Furthermore, because the Auto Pact covers this trade, one would not necessarily expect to observe plant relocation decisions based solely on market criteria. Thus while the results suggest that employment in exports is sensitive to exchange rates, in one very important industry, transportation equipment, the results are necessarily biased toward "no effect." Overall, therefore, the conclusion is that employment in all tradable sectors is sensitive to exchange-rate changes, subject to uncertainties about timing.

Policy

The basic conclusions reached in this study are often tentative, given the rather dramatic swings in the Canadian exchange rate over the past decade. In many cases the data needed to test a number of the key hypotheses regarding the impact of the exchange rate on resource allocation, adjustment costs, and macroeconomic performance – such as external balance and economic growth – are yet to be collected. Given these caveats, however, it is possible to draw some inferences regarding the effects of the exchange rate on competitiveness.

Conclusions

1 The evidence on exchange-rate misalignment indicates that the Canadian dollar has been misaligned twice during the 1980s, according to conventional long-run equilibrium methods. During the period 1983-86, the Canadian dollar was undervalued substantially vis-à-vis the U.S. dollar according to a number of methodologies. There is also evidence that, beginning in 1988, the Canadian dollar became overvalued, although perhaps not as dramatically overvalued as some suggest. In each case, the degree of misalignment of the exchange rate at its extremes was an average of 10 to 15 per cent. At the extremes it could have been undervalued by as much as 25 per cent and overvalued by as much as 20 per cent.

2 The causes of the current account imbalances and in particular the recent large deficit of the current account are far from clear. It appears that misalignment of the exchange rate is only partially responsible. Contributing factors were the consumption and housing boom in the mid-1980s and the low real commodity prices of the post-1984 period.

3 Most economists believe that the exchange rate is still an important mechanism by which external balance or imbalance is sustained. Furthermore, it was concluded that changes in the real exchange rate at the industry level have fairly direct effects on industry output and employment in both export- and import-competing sectors. In all cases, however, the lags are both variable and in some cases substantial.

4 It was concluded that evidence on exchange-rate pass-through is inconclusive but interesting. It appears consistent with the hypothesis that import prices change fairly quickly in response to changes in the U.S.-Canada exchange rate. At the same time it appears that Canadian exporters tend to price in Canadian dollars at the aggregate level, indicating that the pass-through to export markets of exchange-rate changes is fairly immediate. On the other hand, some evidence for particular sectors suggests that prices only reflect exchange rate changes with a considerable lag. On balance it does not appear that the problem of weak links between exchange rates and prices of tradable goods is of particular importance for Canada.

5 At the moment there is no evidence for "trade hysteresis." In other words, the possibility of permanently altered trade shares due to temporary exchange-rate changes does not appear to be supported by the data. Some caution must be expressed about this conclusion because of the recent dramatic declines in the Canadian manufacturing sectors; whether these changes will be permanent or temporary will provide important evidence on the possibility of hysteresis in trade. Note that conclusion 4 still holds. Real exchange-rates changes do have an impact on industry output and employment, although these appear to be reversible.

Drawing sharp policy implications from a study such as this requires considerable caution. The tendency to confuse correlation with causation pervades all economic debate, and this is no more evident than in the current policy debate in Canada on the role of the exchange rate in determining competitiveness. International competitiveness is determined by a host of factors, of which the exchange rate is only one. In the short run, however, the dramatic swings in the value of the Canadian dollar have been orders of magnitude greater than changes in other traditional determinants of competitiveness such as wages, the cost of capital, or productivity. It is not surprising, therefore, that many commentators have focused on the exchange rate as a source of "non-competitiveness." The conclusions of this study support the view that exchange rates can become temporarily misaligned, in some cases for apparently surprisingly long periods. Furthermore, these exchange-rate changes can be expected to have fairly significant and immediate effects on the sectors involved in international trade. These effects involve both short-term changes in output and employment and longer-term effects on investment and high-skill jobs. To the extent that the longer-term effects tend to become

more prevalent, there is certainly cause for worry in a small open economy such as Canada's. Plant closures and the exit of highly skilled people from Canada is a process that will reverse itself only slowly, and quite likely involving a period of substantial exchange rate depreciation beyond that required by the fundamentals. In general, it appears that the exchange rate is a "price" upon which too much of the adjustment is forced.

In attempting to go further than the above observations, things become less certain. Answers as to why the exchange rate does what it appears to do and what policy alternatives are available are at best uncertain.

First, the question of why the exchange rate appears to become so badly misaligned is far from clear. There appears to be no single theory that provides a clear guide to the behaviour of exchange rates over the short to medium term. The impact of exchange-rate changes, however, is much clearer. Many people consider the tight money policy of the Bank of Canada to be directly responsible for the high Canadian dollar. There is no evidence that unambiguously confirms this theory. Other countries have experienced periods of appreciating exchange rates in the face of weakening monetary policy. It could be, for example, that in the face of the current large-scale international uncertainty due to developments in the Middle East and the Soviet Union, the Canadian dollar is viewed as a safe-haven currency, and thus has appreciated beyond what would be normally expected. The equally dramatic undervaluation of the Canadian dollar during the late to middle 1980s would appear to contradict this theory, however. Placing the blame on fiscal policy is equally implausible. In fact, as a percentage of GDP the fiscal deficit shrank during the late 1980s, a period when the Canadian dollar appreciated dramatically.

The fact that economists cannot explain the short- to medium-term determinants of the exchange rate does not make matters any easier for the conduct of policy. Because the exchange rate does have important allocative and distributional effects, it evidently may be necessary to develop policy in the absence of complete knowledge. On the question of the exchange rate, policymakers are somewhat like doctors dealing with the symptoms of a disease with an uncertain cause. The correct approach might be to ignore the exchange rate and assume that in the longer run the market will do what is necessary, provided policy focuses on the basics such as productivity and price stability. However, it is equally possible that the swings in the exchange rate and the level of the exchange rate itself is sufficiently "decoupled" from economic fundamentals that action aimed directly at the exchange rate is called for. If the financial and human costs of the resource reallocation induced by the observed swings in the exchange rate are not justified on grounds of efficient resource-allocation criteria, then the case for eliminating such resource movement is strong. In my judgment, the collective international and Canadian experience with floating exchange rates justifies the pursuit of alternative exchange-rate arrangements. Canada's options are quite limited, however. In principle the country could pursue a range of options, from monetary union with the United States to fixing the exchange rate unilaterally to pursuing a managed exchange-rate policy. Realistically, the last option would appear to be the only one available in the near term.

However, exchange-rate management must be sufficiently prudent as to avoid making large inadvertent errors. Ultimately the exchange rate is directly linked to monetary-policy objectives. Managing the exchange rate inevitably means compromising the other goals of domestic monetary policy. At the moment the stated goal of the Bank of Canada is price stability; i.e., an inflation rate in the neighbourhood of 0 to 2 per cent. This goal is set independently of the inflation performance of Canada's major trading partners, and it is presumably independent of other possible external shocks, including the potential misalignment of the other major foreign currencies. It would seem prudent for the Government of Canada and its agent, the Bank of Canada, to place more weight on the exchange-rate objective relative to the other objectives of monetary policy. Operationalizing this objective should be done with two goals in mind: ensuring exchange-rate stability through traditional intervention methods (as the Bank does now) and ensuring that the exchange rate does not become misaligned for substantial periods relative to long-run fundamentals. While it obviously is difficult to give an exact definition of a long-run equilibrium exchange rate, it should be consistent with some notion of an equilibrium real exchange rate, taking into account changes in productivity and changes in price levels between countries. Pursuit of this objective would be tempered by other considerations at particular times, including the growth and employment objectives of macroeconomic policy.

Clearly the details of a managed exchange-rate policy would require more thought and detail than provided here. It is worth noting, however, that the use of a target equilibrium real exchange rate, presumably with fairly wide bands around it, would not conflict with the pursuit of price stability as an objective of domestic policy. Over the longer run, differential inflation rates would be incorporated into changes in the target nominal exchange rate through the usual channels by which purchasing power parity changes in the exchange rate occur. The debate over inflation targets

versus exchange-rate targets would inevitably be reduced to which indicators the Bank would consider in the short term in monetary policy. Should monetary policy be conducted in the short term with an eye only on domestic inflation or should it be concerned with the level of the exchange rate? Operationally, it is suggested that the Bank should view movements in the exchange rate away from its equilibrium value with as much alarm as it does its other inflation-oriented indicators. Inevitably the pursuit of external price stability and internal price stability will sometimes come into conflict. Good policy in these instances must rely on good judgment rather than on strict adherence to any set of rules. For a small open economy like Canada's, the single-minded pursuit of only one goal of monetary policy in all circumstances would inevitably lead to costly policy errors.

Notes

Chapter 1

1 The Ontario Premier's Advisory Council on Technology and Competitiveness issued a high-profile public report in 1989 on these issues.

2 When reading discussions of exchange-rate changes, it is important to pay attention to what units are being used when percentage changes are reported. In comparing an exchange-rate change over a given period, the percentage change differs according to whether the domestic currency price of a U.S. dollar or the U.S. dollar price of a Canadian dollar is used. Any conventional percentage *appreciation* usually means an increase in the foreign currency price of one unit of the home currency. Thus a rise in the Canadian dollar from 80 to 89 cents U.S. would be referred to as a 100 X 9/89 = 10.1 per cent *appreciation*. On the other hand, economists usually define *the exchange rate* as the home currency price of a unit of foreign exchange. Thus the current Canadian exchange rate vis-à-vis the U.S. dollar is given by a number such as 1.15 or 115, depending on the units used. Confusion is particularly likely in the case of Canada-U.S. comparisons because there have been substantial periods in which the two currencies were close to *par* – i.e., one U.S. dollar was equal to one Canadian dollar. The only advice that can be given is to be careful in interpreting statements regarding the exchange rate or changes in it.

3 The data are drawn from Hooper and Larin [1989].

4 Dornbusch [1980] summarizes this literature. In addition, Dornbusch [1976] represents the seminal paper on exchange-rate overshooting; this paper had a profound effect on the academic view of the flexible exchange-rate system during the late 1970s.

5 Studies that review attempts to test the asset-market approach include Backus [1984], Frankel and Meese [1987], Lafrance and Racette [1985] (the latter for Canada), and Meese and Rogoff [1983].

6 For a variety of views from this perspective, see Frankel [1986], Krugman [1989], McKinnon [1984], and Williamson [1985]. Shiller [1986] contains a useful review of new and old arguments on the possible irrationality of asset markets, including exchange-rate markets.

7 A number of studies on exchange-rate misalignment are contained in Marston [1988]. These studies are almost all concerned with the U.S.-yen and U.S.-deutsche mark exchange rates.

Chapter 2

1 See Husted and Melvin [1990, Chapter 12], and the collection of essays in Marston [1988] for reviews on this subject.

2 The literature on PPP is vast. Summaries are provided by Officer [1976] and Dornbusch [1988]. A recent prominent example of the use of PPP is contained in Mundell [1990].

3 A useful discussion of real exchange rates and their determinants is contained in Krugman and Obstfeld [1988], Chapter 15, pp. 388-401. A more technical presentation of alternative models of the real exchange rate is contained in Neary [1988].

4 See Marston [1986], and Krugman and Obstfeld [1988], Chapter 15.

5 See Dornbusch et al. [1977].

6 See Hooper and Larin [1989] for a review of this literature.

7 See Rao and Lemprière [1990, Table 5].

8 This assumes that α, the share of the nontraded sector, is about 0.666 and the implied relative labour productivity decline in Canadian traded goods industries is about 10 per cent.

9 This is computed using the terms of trade index reported in the *Bank of Canada Review*, Table J5, Summer 1990.

10 See Dornbusch [1980], Chapter 6, for references and an exposition of the dependent economy model.

11 See Rao and Lemprière [1990] on productivity and unit labour cost comparisons between Canadian and U.S. manufacturing.

12 Sometimes multilateral exchange rates are referred to as *effective* exchange rates.

13 Let δ denote percentage change. Given a geometric index for R, the percentage change in R is a weighted average of the percentage change in each of its components. Note that these numbers are only approximate, since they use the equivalence between the percentage change in a variable and the negative of the percentage change in the inverse of the variable; this equivalence is only valid for fairly small changes in the variable in question.

14 This indicates the potential misuse of multilateral exchange rates. Some might argue that there had been no *true exchange rate appreciation* because the multilateral rate has remained unchanged. Appreciation against the United States has been offset by depreciation against other currencies. While this is true with respect to aggregate nominal multilateral rates, it is not with respect to real exchange rates, as the above calculations indicate.

15 Any such statement sounds like a prediction and, therefore, is likely to be proved incorrect. As of this date (February 1991), it seems to be the consensus view regarding the U.S. dollar.

Chapter 3

1 Monetarists would argue that tight money today is necessary to reduce inflationary expectations and thus reduce real interest rates in the future.

2 It is possible to adjust this equation so that b is a positive or negative constant at some exchange rate; there is some element of arbitrariness in this, but it should not matter for medium-term questions regarding exchange-rate misalignment.

3 This may not be exactly correct. Canada may not be able to affect world real interest rates, although it may have considerable ability to influence its own real interest rate, in the short run at least.

4 In an appendix to a book on Canada-U.S. free trade, Williamson discusses his concept of *fundamental equilibrium exchange rates (feer's)* (also discussed in Williamson [1985]). His conclusion was (circa 1986) that the *feer* value for the Canadian dollar was 76-75 cents U.S.

5 Under risk neutrality, the IRP theory is amended to the statement that the *expected* exchange rate devaluation equals the difference between the domestic and foreign interest rate. To calculate the expected exchange devaluation, one must multiply the amount of any devaluation by the probability of occurrence. If devaluations are rare events, the probability may be quite small. This form of the IRP hypothesis is difficult to test from the data, because it is possible that an exchange-rate depreciation was expected probabilistically over a given period but did not occur, thus rationalizing the observed interest-rate differential.

6 The evidence on IRP theory is reviewed in Frankel and Meese [1987].

7 In deriving equation (3.11), equation (3.2) is approximated by a simpler equation substituting the expression $(1 + r - g)$ for $(1 + r) / (1 + g)$. The two are approximately equal for small values of r and g.

8 Indeed, the first two quarters of data indicate that the current *a* account deficit might exceed C$20 billion. The merchandise trade exports improved in the second quarter as a result of an increase in auto exports.

9 See Frenkel and Razin [1990] for a useful exposition of the new classical approach. The introductory chapter justifies the use of the theory from some broad characteristics of macroeconomic data over the recent period.

10 See Bruce and Purvis [1986] for a discussion of Ricardian equivalence and its relevance to the debate on the national debt.

11 See Dornbusch [1990] and Stockman [1987] for reviews of the evidence to date.

12 The U.S. debate on this question is reviewed in Branson [1988]. See also the comments on this paper by Obstfeld [1988]. The empirical evidence in favour of the classical approach is discussed in Stockman [1987]. Dornbusch [1990] provides a critical overview of the evidence on both sides of the debate.

13 Within the "misaligned exchange rate" view, one can distinguish at least three different hypotheses as to why the Canadian dollar is "overvalued." These are:

a) tight money in Canada causes high real interest rates, which lead to Canadian dollar appreciation;

b) large and continuing budget deficits are responsible for high Canadian real interest rates, which have led to Canadian dollar appreciation; and

c) the Canadian dollar is overvalued relative to fundamentals because of foreign exchange market irrationality, the persistence of bubbles, and so on.

14 Note these figures are not savings rates, i.e., savings as a percentage of personal disposable income. The savings rate has recently been on the order of 10 per cent.

15 Bruce and Purvis [1986] discuss the policy issues surrounding public-sector deficits and the consequent rise in the public debt.

16 Technically, we assume an aggregate Cobb-Douglas utility aggregator for current real consumption.

17 As discussed in Chapter 2, relative differences in productivity growth between the nontraded and traded goods sectors would shift the underlying supply curve. Given the relatively short time period used in this exercise, we assume that any of these type of effects would be relatively small.

18 $R^{\wedge}$ denotes the relative change, $\Delta R/R'$ (and similarly for other variables).

19 The supply curve is given by $Q/GDP = \omega\,(1/R)^{\xi}$. Equating supply to demand yields the expression

$$\frac{\gamma A R}{GDP} = \frac{\omega}{R^{\varepsilon}}.$$

Let $z = A/GDP$. Then differentiating and using the expressions for supply and demand yields the equation $-(\varepsilon + 1)\,\hat{R} = \hat{z}$.

20 This issue will be taken up in Chapter 4 in the discussion of trade hysteresis.

Chapter 4

1 See Baldwin [1988*a*, 1988*b*], Baldwin and Krugman [1989], Krugman and Baldwin [1987], and Dixit [1989*a*, 1989*b*].

2 A similar study for the United States is Branson and Love [1988].

3 The reported coefficient on the exchange rate is the sum of the α_i – that is the long-run elasticity of employment with respect to the real exchange rate.

4 Brown [1990] finds the role of the exchange rate as it affects the cost of imported intermediate inputs is an important component in explaining the general equilibrium impacts of exchange-rate depreciation on pricing and employment in Canadian and U.S. industry.

5 This reflects the dynamic lag structure of employment in wood products to real exchange-rate changes. The one-quarter lagged coefficient is positive while the fourth-quarter lag is negative, leading to the small estimated sum of coefficients. As of the end of 1989, the complete dynamic response had yet to feed into the estimated employment.

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